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Chronology of KSC and KSC Related Events for 1991

National Aeronautics and
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John F. Kennedy Space Center



**CHRONOLOGY OF KSC
AND KSC RELATED EVENTS
FOR 1991**

**BY KEN NAIL, JR.
KSC LIBRARY ARCHIVIST**

FOREWORD

This 1991 Chronology is published to fulfill the requirements of KMI 2700.1 (as revised) to describe and document KSC's role in NASA progress.

Materials for this Chronology were selected from a number of published sources. The document records KSC events of interest to historians and other researchers. Arrangement is by date of occurrence, though the source cited may be dated one or more days after the event.

Materials were researched and prepared for publication by Historian-Archivist Ken Nail, Jr., of EG&G FLORIDA, Inc. The 1991 Chronology includes two appendices: (A) Shuttle Era Firsts (p. 261) and (B) Shuttle Landings at KSC (p. 263). A General Index (p. 264) and a Company Index (p. 274) have been included for added convenience to researchers, and each entry has been headlined.

Comment on the Chronology should be directed to the John F. Kennedy Space Center, LIBRARY-E, Kennedy Space Center, Florida, 32899.



Walter L. Covington
Center Services

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JANUARY

January 2:

CHILD-CARE FACILITY OPENS

This morning the doors to Kennedy Space Center's child-care facility were opened for the first time. About 120 children of KSC employees have been registered and there is a waiting list for the infant room, according to **Michael Weissman**, Manager of the facility for Tutor Time Space Coast Inc. "The first day was really a delight. It all went very smoothly," Weissman said. NASA government employees have priority over contractors for available space in the child care facility. An industrial area security gate off Kennedy Parkway South was moved to keep the day-care center off secured property so that parents without KSC identification badges could get to their children. KSC security officers have been trained in emergency medical techniques for children. [Banke, FLORIDA TODAY, p. 1B, Jan. 3, 1991.]

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KSC BAT PATROL

USBI Co. workers who rebuild Shuttle boosters are looking to bats for relief from Space Coast mosquitoes which pester them in their unscreened 10-story building. At a cost of \$100, workers from USBI and the Brevard Museum of History and Natural Science will place three bat houses next to the USBI facilities. The three houses are expected to attract about ten wild bats who should consume about 600 mosquitoes per hour, according to Museum Curator **Merle Kuns**. [Jones, FLORIDA TODAY, p. 1A, Jan. 3, 1991.]

January 3:

ORBITER PROCESSING

Today the payload bay doors of Discovery are to be opened and the Ku-Band antenna is to be deployed and checked. The forward reaction control system is scheduled to be installed this evening. The rudder speed brake has been inspected and redundancy checks are underway. Atlantis is scheduled to be powered up today and the payload bay doors opened. The number 3 auxiliary power unit is scheduled for installation today; the remote manipulator system will be installed over the weekend. Inspections of the nose cap are continuing. Technicians are setting up platforms in Columbia's aft compartment to begin post-flight inspections. Access to the crew cabin is being established and some tile operations are scheduled. Booster stacking operations are continuing for Atlantis' STS 37 mission. A new 17-inch liquid hydrogen disconnect is being installed on the external tank this week. [KSC SHUTTLE STATUS REPORT, Jan. 3, 1991.]

January 4:

CEA, INC. CONTRACT

CEA, Inc. (Canton, MA) has been awarded a \$534,000 contract for fiber-optic cable work at Kennedy Space Center. The small business firm will furnish and install one 144-fiber cable from a main communications switching center, the Vehicle Assembly Building Repeater (VABR) in the Launch Complex 39 area, to the Orbiter Modification and Refurbishment Facility (OMRF). Two cables of the same capacity will also be provided to run from the VABR to the Launch Control Center (LCC). A second part of the contract calls for the installation of two 36-fiber cables from

the VABR to the Lockheed Logistics Facility and a copper audio cable link to a weather instrumentation location. [Kristofferson, KSC NEWS RELEASE NO. 3-91, Jan. 4, 1991.]



SANTA CRUZ CONSTRUCTION CONTRACT

Santa Cruz Construction (Merritt Island, FL) was awarded a \$144,294 contract by Kennedy Space Center for the installation of underground communications conduits and access manholes in the center's Industrial Area. The small business firm will install the conduits to provide a communications pathway under NASA Causeway East and to expand hardware capabilities for the KSC Operational Intercommunication System (OIS). The OIS provides communications links between the Space Shuttle Orbiter and payload processing facilities, the Launch Control Center and Launch Pads 39A and 39B. [Kristofferson, KSC NEWS RELEASE NO. 4-91, Jan. 4, 1991.]



SAUER, INC. CONTRACT

Sauer, Inc. (Jacksonville, FL) was awarded a Kennedy Space Center contract today worth \$1.13 million for the removal of existing air handling units in the Vehicle Assembly Building and replacement with new models featuring computerized automatic temperature control. [Kristofferson, KSC NEWS RELEASE NO. 1-91, Jan. 4, 1991.]



TRITON MARINE CONSTRUCTION CONTRACT

Kennedy Space Center today awarded a \$3.2 million contract to Triton Marine Construction (Houston, TX) for the rehabilitation and repair of four bridges at KSC. (See story below.) [Kristofferson, KSC NEWS RELEASE NO. 2-91, Jan. 4, 1991.]



DISCOVERY PROCESSING: STS 39

The forward reaction control system (FRCS) was installed overnight; an interface test of the system will be conducted tomorrow. The payload bay doors have been opened today and the Ku-Band antenna has been deployed for checks. Engineers are evaluating a problem with the pilot's attitude director indicator, a navigation aid that gives the crew information about the Orbiter's attitude in terms of pitch, yaw and roll. Exhaust ducts of the three auxiliary power units were tested and the data are being evaluated. [KSC SHUTTLE STATUS REPORT, Jan. 4, 1991.]



ATLANTIS: GPC INSTALLATION

Atlantis is powered up today for routine tests. The new general purpose computers are being installed in the Orbiter. Connections of the number 3 APU are continuing. The remote manipulator system is at the OPF and remains scheduled for installation this weekend. Instrumentation is being installed for the flutter buffet modification. Booster stacking operations are continuing. The left

aft center segment is being mated to the left booster today. The left forward center segment is scheduled for mating early next week. Technicians are aligning the new 17-inch liquid hydrogen disconnect in the proper position on the external tank. [KSC SHUTTLE STATUS REPORT, Jan. 4, 1991.]

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STS 35 (COLUMBIA) PROCESSING

Technicians removed the sleep stations from Columbia's crew cabin yesterday. Tiles are being waterproofed and post-flight inspections in the aft compartment have commenced. [KSC SHUTTLE STATUS REPORT, Jan. 4, 1991.]

January 7:

DELTA 2: FIRST 1991 LAUNCH

A NATO communications satellite was the first payload lifted to orbit in 1991 aboard a Delta 2 rocket at 7:53 p.m. tonight. The Cape Canaveral Air Force Station launch had been delayed 68 minutes due to overcast skies caused by the presence of two thunderstorms moving over Central Florida. Don Tutwiler, Director of the McDonnell Douglas Delta Launch Vehicle Division, said, "Launching was like threading a needle." Built by Marconi Space Systems and British Aerospace, the \$110 million dollar NATO satellite will allow political leaders to communicate with each other and with the organization's Brussels, Belgium, headquarters. [Brown, FLORIDA TODAY, p. 1A, Jan. 7, 1991, and Brown, FLORIDA TODAY, p. 2A, Jan. 8, 1991.]

January 8:

SHUTTLE FLOW DIRECTORS NAMED

Kennedy Space Center recently named flow directors for the Space Shuttle Orbiters Discovery and Endeavour. John J. "Tip" Talone has been named as the Flow Director for NASA's newest Orbiter, Endeavour, which is undergoing construction in Palmdale, CA. John C. "Chris" Fahey has been chosen as Flow Director for Discovery. [Malone, KSC NEWS RELEASE NO. 5-91, Jan. 8, 1991.]

January 10:

ATLANTIS WINDOW REPLACEMENTS

Both Atlantis and Columbia suffered some damage to their windows during their most recent missions; two windows must be replaced on Atlantis at a cost of approximately \$200,000. A window on Columbia is also suspect. "Whatever it is [that is damaging the windows], it's pulverizing itself when it hits the window. With the heat and the intensity it creates, it often just disappears," according to NASA Structures Engineer Gennaro Caliendo. Kennedy Space Center technicians have already begun replacing the windows on Atlantis at either end of the cockpit. Atlantis returned to Earth with more damage to its windows and heat protection tiles than experienced on previous missions. Calvin Schomberg, Projects Office Engineer at Johnson Space Center, said that most of the damage was confined to the front end of Atlantis so that he thought it had occurred during launch or landing. [Banke, FLORIDA TODAY, p. 2A, Jan. 11, 1991.]

January 11:

STS 39 PROCESSING: DISCOVERY

Power on testing of Discovery continues today. Ammonia boiler servicing is scheduled to resume today also. The high bay of the OPF will be cleared for this operation. Results of the routine leak checks on the main propulsion system are reported good. Auxiliary power unit leak and functional checks indicate possible lube oil seepage around APU number 2. Repressurization tests and additional analysis will be performed. Potable water servicing and main engine heat shield and carrier panel installation continues today. Elevon cove leak checks are complete. OMS pod verifications are scheduled to continue this weekend. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 11, 1991.]

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OPF BAY 2: ATLANTIS PROCESSING

Fuel cell power reactant and storage distribution system tests and liquid hydrogen leak and functional tests continue today. APU leak and functional tests and final connection operations are also continuing. The outside pane of Atlantis' window number 1 has been removed. The seals are currently being cured for installation of the replacement pane. Window number 6 will be changed out next week. In the Vehicle Assembly Building, the left forward solid rocket booster segment was lifted and mated to the existing segments on the mobile launcher platform in high bay 3. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 11, 1991.]

January 12:

KIT SPEEDS PROCESSING WORK

NASA contractors are borrowing an idea from the airline industry which involves gathering the parts a technician needs for a specific task in advance, gathering them on a tray and delivering the complete "kit" to the worker's post. The idea has enabled KSC technicians to exercise increased efficiency in processing Shuttles for launch. "You can't ever process the Shuttle like an airplane. It's just too complex," said Pan Am World Services Manager Don Baumann, "but you can borrow ideas from the airlines and apply them here." The system will be adapted for about 250 routine Shuttle processes. [Banke, FLORIDA TODAY, p. 10E, Jan. 13, 1991.]

January 15:

PAYLOAD STATUS REPORTS

The Tethered Satellite (TSS, STS 46) has been undergoing receiving inspection and initial tests in an off-line laboratory of the payload Operations and Checkout Building. Hardware associated with the TSS deployer is currently being integrated onto the pallet as well as integrating some associated experiments onto the mission peculiar support structure (MPESS). The first fit check of the satellite with the deployer is scheduled to occur January 17 and will extend until January 22. A second fit check will also be scheduled for later this month or during February. Today the alignment of the Gamma Ray Observatory's two sun sensors is being conducted. Fueling of GRO (STS 37, Atlantis) for its on-orbit activity was completed January 10 as scheduled. A total of 4200 pounds of monomethylhydrazine was loaded aboard (three to four times more fuel than is

required by most spacecraft). This large quantity of fuel will permit extended mission operations. Yesterday and today, work has been underway to remove the GRO's test batteries and install the six nickel cadmium flight batteries which are housed in two modular power supply units (MPS). The MPS units will be installed on the spacecraft tomorrow. The Instrument Switching Unit (ISU) which was removed on December 23, 1990, shipped to TRW, repaired and retested was reinstalled on the spacecraft yesterday. Integration and system tests are scheduled to start January 18. The ISU contains circuitry which controls electrical signals to various equipment throughout the Observatory which will be moved from the Payload Hazardous Servicing Facility (PHSF) to the Vertical Processing Facility (VPF) on February 6 for final tests and processing for integration with Atlantis. Final assembly, functional testing, and rf system testing of the Inertial Upper Stage for TDRS-E - STS 43, Discovery - has been completed by the Air Force/Boeing test team on Cape Canaveral Air Force Station. IUS buildup operations are scheduled for completion in mid-February. Due to possible limited availability of military aircraft due to the Persian Gulf situation, TDRS-E may be shipped early to KSC from the TRW plant in California. [PAYLOAD STATUS REPORT, Jan. 15, 1991.]

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STS 39 PROCESSING

Cross feed lines of the orbital maneuvering system pods have been connected and leak check operations on those lines continue today. Final checks of the power reactant storage and distribution system (PRSD) and water spray boiler will also be conducted today. Following final tests on the auxiliary power units, all three APUs have been cleared for flight with final pressurization decay checks to continue as scheduled. Potable water sampling tests take place today. Several days of hydraulic operations are scheduled this week. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 15, 1991.]

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ATLANTIS: APUS INSTALLED

Installation of APU number 3 was completed last night and the OPF Bay 2 was reopened for normal processing operations. PRSD fuel cell operations continue and the water spray boiler has been installed. Main propulsion leak testing continues. Work to replace window number 6 is on schedule. Hydraulic fill and bleed operations will be conducted this week following hydraulic operations on Discovery. In the Vehicle Assembly Building, the left forward solid rocket booster segment was pinned to the existing segments on the mobile launcher platform in high bay 3. The right aft segment will be taken to the VAB today with stacking operations scheduled for later today. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 15, 1991.]

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COLUMBIA PROCESSING

Aft flight deck reconfiguration of Columbia continues today. Both left and right landing gear strut checks are in process; tile work also continues today. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 15, 1991.]

January 16:

DISCOVERY PROCESSING-OPF BAY 1

Scheduled operations continue in the Orbiter Processing Facility this week. Leak and functional tests on the auxiliary power units have been completed. Checks of Discovery's twin orbital maneuvering system pods cross feed lines continue today. The OMS actuator was checked out yesterday without any problems identified. Extensive integrated Orbiter hydraulic operations are underway and are expected to last throughout the week. Hydraulic operations today include functional testing of the landing gear, brakes and nose wheel steering. Rollout of the vehicle to the Vehicle Assembly Building is scheduled for no earlier than January 29. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 16, 1991.]

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STS 39: APU 3 ASPIRATED

The exhaust on auxiliary power unit number 3 of Atlantis will be aspirated today as retesting on the unit continues. Hydraulic fill and bleed operations will be conducted tonight following today's hydraulic operations on Discovery. Main engine installation is currently scheduled to begin this weekend. The two OMS pods are currently located in the Hypergolic Maintenance Facility. There, work to install thrusters on the right hand pod is underway as final quick disconnect checks on the left hand pod continues. In the Vehicle Assembly Building high bay 3, build up of the right solid booster segments continues on the mobile launcher platform. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 16, 1991.]

January 17:

VISITOR ACCESS RESTRICTED

The start of war in the Persian Gulf has already impacted Kennedy Space Center. Visitor access to Cape Canaveral Air Force Station has been stopped indefinitely by military officials because of increased security there. Self-guided tours of the Cape's Air Force Space Museum on Sundays have also been suspended. Spaceport USA tours of Kennedy Space Center will continue, however. KSC officials said that 27 space center workers had been activated as reservists and a support group for dependents was beginning to be organized. "A lot of NASA people were called to active duty so we have a special reason to hope for an early, successful conclusion of the operation," said NASA Administrator Richard Truly. "My admiration for the men and women in the Gulf knows no bounds and they have the full support of NASA." KSC Director Forrest S. McCartney said, "The people who were called are important members of the team and we're looking forward to them coming home. It's regrettable we live at a time when these kinds of crises happen." ["NASA Restricts Visitor Access," FLORIDA TODAY, p. 4A, Jan. 18, 1991.]

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STS 39 PROCESSING: DISCOVERY

Scheduled operations continued today in the Orbiter Processing Facility at Kennedy Space Center. Water spray boiler servicing has been completed and

hydraulic operations continued in progress. Yesterday, brake anti-skid tests and landing gear functional tests were completed. Discovery's two orbital maneuvering system pods continue to undergo checks today. Sleep station installation operations are currently being worked. During helium purge operations last night, engineers determined there may have been hydraulic fluid introduced into the high pressure oxidizer turbopump on main engine number three. Crews will analyze the potential problem and make further evaluations tomorrow. Rollover of Discovery to the Vehicle Assembly Building remains scheduled for no earlier than January 29. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 17, 1991.]



STS 37 PROCESSING: ATLANTIS

Hydraulic fill and bleed operations on Atlantis were conducted successfully last night along with checks of the nose wheel steering mechanism. Hydraulic operations will continue throughout the remainder of the week. Main engine installation is currently scheduled to begin this weekend. In the Vehicle Assembly Building High Bay 3, buildup of the right solid rocket booster segments continued on the mobile launcher platform. The right aft center segment will be delivered to the VAB today. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 17, 1991.]



STS 40 PROCESSING: COLUMBIA

The ground service equipment was installed in the payload bay of Columbia last night as crews today continued with plans to remove the provisions stowage assembly (PSA) from the bay. Preparations also continued to access the dump line nozzle in the waste management system for failure analysis. Columbia is scheduled to be moved to the Orbiter Processing Facility later this month following the rollover of Discovery from the VAB. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 17, 1991.]



PAYLOAD STATUS REPORT

Pre-flight checkouts and testing of the STS-39 (Discovery) payloads continue to proceed on schedule in both the Orbiter Processing Facility (OPF) and the Vertical Processing Facility (VPF). The CRO and MPEC payloads are mounted in the forward section of Discovery's payload bay and are undergoing checkouts in the OPF. AFP-675, IBSS/SPAS-2 and STP-1 are hanging vertically in the VPF. The IBSS/SPAS-2 End-to-End Test and Interface Verification Test and STP-1 End-to-End Test were all satisfactorily completed this week. These three payloads are scheduled to be transported from the VPF to the launch pad on February 1. No significant problems are being worked on the Space Life Sciences-1 payload for STS-40, currently scheduled for launch in May 1991. A three-day long health check of the SLS-1 experiments and module should be completed by the end of the week. SLS-1 is scheduled to be transported from the Operations and Checkout Building and implemented from the Columbia at the OPF on or about March 7. Checkouts and testing of the International Microgravity Laboratory-1

(IML-1) elements continues inside the Operations & Checkout Building High Bay. The IML-1 payload for STS 42 was transferred to the Spacelab Integration area in Test Stand 2. The IML-1 floor and experiment rack integration is underway. The integration of #7 SL-J (Spacelab-J) rack (STS 47, August 1992) is proceeding inside the Operations & Checkout Building High Bay. Representatives from both NASDA and Mitsubishi Heavy Industries are on-hand and assisting with the operations. [KSC PAYLOAD STATUS REPORT, Jan. 17, 1991.]



HYDRAULIC FLUID CONTAMINATION: DISCOVERY

One of Discovery's turbopumps may be contaminated by the infiltration of a small amount of hydraulic fluid, according to Kennedy Space Center spokesman Bruce Buckingham. "Any amount of fluid is enough to contaminate the turbopump. They think that probably happened," he said. If contaminated, the turbopump must be replaced; alternatively, the entire engine may be swapped for one from another Shuttle. Any replacement work would be undertaken at Launch Complex 39A after rollout, Buckingham said. Presently, Discovery is scheduled to be rolled over to the Vehicle Assembly Building from the Orbiter Processing Facility on January 29; the STS 39 mission is scheduled for February 26. Discovery's payload which includes experiments for the Strategic Defense Initiative Organization and Air Force Space Systems Division, will be rolled to the launch pad February 1. [Banke, FLORIDA TODAY, p. 10A, Jan. 18, 1991, SEE ALSO: Glisch, THE ORLANDO SENTINEL, p. A-6, Jan. 18, 1991, Brown, FLORIDA TODAY, p. 10A, Jan. 24, 1991, and Date, THE ORLANDO SENTINEL, p. A-5, Jan. 24, 1991.]

January 18:

DISCOVERY PROCESSING

Crossfeed leak checks between the twin orbital maneuvering system pods of Discovery and the forward reaction control system will be made today. Final hydraulic checkouts are scheduled for early completion today with flight controls and main engines undergoing final cycling operations. After these operations, the main engine locks will be placed on the three engines to allow workers an opportunity to further check the high pressure oxidizer turbopump on engine number 3 for possible hydraulic fluid contamination. Results of this inspection are expected tonight. [See stories below.] Rollout of the Orbiter to the Vehicle Assembly Building is currently planned for the end of the month. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 18, 1991.]



ATLANTIS PROCESSING STATUS

Hydraulic operations for Atlantis' STS 37 mission continue today. The payload bay doors will be cycled closed then reopened today for K-U Band testing. Preparations for the main engine installation are also underway. SSME installation is scheduled to begin January 20. In the hypergolic maintenance facility, fifth flight checks continued on the left hand orbital maneuvering system pod. The forward reaction control system (FRCS) is undergoing functional test this week. Installation of the FRCS into the Orbiter is targeted for late next week.. In the

Vehicle Assembly Building's High Bay 3, building of the right solid rocket booster continued on the mobile launcher platform. The right aft center segment will be lifted and mated to the stack tonight. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 18, 1991.]

January 19:

NO CONTAMINATION FOUND

Inspections concluded late on yesterday showed that no hydraulic fluid contamination of Discovery's main engine turbopump, according to Kennedy Space Center officials. The engine will not have to be replaced. "Everything seems to be OK and work is proceeding on schedule," said KSC spokesman **Bruce Buckingham**. Last week technicians purged Discovery's No. 3 engine with gaseous helium while testing for evidence of hydraulic fluid contamination. [Banke, FLORIDA TODAY, p. 11A, Jan. 20, 1991.]

January 20:

SUPPORT GROUP AT KSC

Employees at Kennedy Space Center with family or friends in the Persian Gulf have been given the opportunity to form a support group. A meeting held on January 22 in the training auditorium will inform workers of the types of assistance local communities are offering to help people to cope with the war in the Middle East. EG&G Florida Inc.'s Dr. Bud Ferguson will guide the workers in forming the groups which would meet in offices or homes off space center property to allow for non-employees to attend their meetings. KSC managers have identified at least 27 workers who have been called to active duty as part of the military reserves and all of these had already been sent overseas before hostilities commenced on January 16. Information about the support groups is available at KSC by calling 867-7398. [Banke, FLORIDA TODAY, p. 4A, Jan. 21, 1991.]

January 22:

SPC EVALUATION WORST IN 4 YEARS

NASA officials today disclosed that its Shuttle Processing Contractor - Lockheed Space Operations Co. - received 89 points of a possible 100 on its recent evaluation, the worst such evaluation in four years. As a result, Lockheed's rating fell from "excellent" to "very good." A number of shuttle processing accidents contributed to the lower rating. Lockheed President **Doug Sargent** said, "Naturally, we are very disappointed to receive a lowered grade for our performance during this period, but I would totally reject any implication that the overall quality of our work has eroded." Lockheed spokesman **John Williams** said, "The tone of the report is that our overall performance was absolutely superb, but it was marred by the occurrence of a few specific incidents. We're doing everything in our power to assure such incidents don't recur," he said. The incidents included: Extensive damage to one of Atlantis' three fuel cells when a Lockheed technician erroneously capped a fuel cell vent, allowing too much pressure to build up. Repair cost \$3.1 million. One of Discovery's payload bay doors was accidentally bent when Lockheed workers moved ground support equipment attached to the door; the door was not seriously damaged. One of Discovery's thrusters was accidentally dropped in a Shuttle Processing Hangar at a cost of \$100,000. A

cooling line in Discovery's payload bay was dented when a technician left a ladder leaning against the three-quarter-inch diameter line. The line was replaced. Kennedy Space Center investigations determined that the primary cause of these incidents was inadequate training and improperly written work procedures, along with a failure to follow proper procedures. [Brown, FLORIDA TODAY, p. 17C, Jan. 23, 1991.]

January 25:

DISCOVERY TRANSFER DELAY

Problems with Discovery's steering thrusters may delay the Orbiter's transfer from the Orbiter Processing Facility to the Vehicle Assembly Building, according to Kennedy Space Center spokeswoman **Lisa Malone**. "We're still looking at the thrusters. We won't know if we'll have to replace them until after we've looked at the results of tests planned for this weekend," she said. She added that spare thrusters are available at KSC. [Banke, FLORIDA TODAY, p. 8A, Jan. 23, 1991, Banke, FLORIDA TODAY, p. 6A, Jan. 25, 1991, Banke, FLORIDA TODAY, p. 6A, Jan. 26, 1991.]

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INTERNATIONAL TRAVEL CURTAILED BY WAR

"All international travel should be discouraged until the Middle East situation can be better assessed," according to a recent KSC Bulletin distributed last week. Kennedy Space Center spokesman **Bruce Buckingham** said that NASA officials have curtailed travel overseas in light of hostilities in the Middle East. Workers from the space center will staff NASA's three European and African emergency landing sites during the STS 39 mission. Only workers required for the actual operation, however, will travel to those sites. Put on indefinite hold are plans to train new workers at the overseas landing fields, according to Buckingham. [Banke, FLORIDA TODAY, Jan. 26, 1991.]

January 26:

GENERAL PURPOSE COMPUTERS

"We're really looking forward to these new computers," said **Ron Dittmore**, lead Flight Director for the upcoming STS 39 Discovery mission. The new computers are upgraded general purpose computers that work three times faster and hold twice the memory of their predecessors; the computers have been installed in both Atlantis and Discovery. Columbia will receive its new computers after its scheduled Spacelab mission in May, according to **Frank Littleton**, Manager of the Orbiter Avionics Systems Office at Johnson Space Center (Houston, TX). Littleton said the software for the new GPC's is essentially the same as that used previously on Orbiter computers. [Banke, FLORIDA TODAY, Jan. 27, 1991.]

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ENDEAVOUR TO ARRIVE IN MAY

The newest Space Shuttle - Endeavour - is essentially finished and will arrive at Kennedy Space Center in May. "It looks good," according to **John "Tip" Talone** who has been assigned as NASA's Processing Manager for the Orbiter. Talone said, "When you see an Orbiter with all the new tile on it, clean as a whistle, it's

pretty impressive." Talone's counterpart with the Shuttle Processing Contractor Lockheed Space Operations Co. is **Eric Clanton**. When Endeavour arrives, its three main engines and two orbital maneuvering system pods will be installed at KSC. Lockheed might need to hire additional contractor technicians to meet the work demand imposed by the larger fleet, according to Clanton. "That's an additional demand on Lockheed as a company, so I'm sure there will be some resource build up, but not all of those people will go directly to Endeavour. You'll see a mix of experienced and inexperienced people working on Endeavour." **John Fahey**, formerly a Shuttle Project Engineer, will be Discovery's new Flow Director. He says there won't be much increase in NASA jobs. "There were conscious decisions made a couple of years ago to increase those numbers, start hiring and training, get people certified and experienced, so that when the Endeavour team had to be formed there would be resources to pull from," he said. [Banke, FLORIDA TODAY, pp. 9E-10E, Jan. 27, 1991.]



BRIDGE REPAIRS AT KSC

Triton Marine Construction (Houston, TX) has been awarded a \$3.2 million contract for the repair of four bridges at Kennedy Space Center. The four bridges are: the NASA Causeway West drawbridge crossing the Indian River and the NASA Causeway East drawbridge over the Banana River. A bridge on Kennedy Parkway North spanning Haulover Canal and the JJ railroad bridge providing a rail link from the Florida mainland across the Indian River are also included in the new contract. ["KSC Bridges Under Repair," FLORIDA TODAY, p. 10E, Jan. 27, 1991.]

January 28:

CHALLENGER COMMEMORATED

"We will never forget them," said NASA Administrator **Richard Truly**, speaking of the Challenger crew who lost their lives five years ago today in the nation's worst space accident. Flags were lowered to half-staff and for 73 seconds - the length of Challenger's flight on January 28, 1986 - the entire Kennedy Space Center paused in its work to honor the memory of the seven members of the Challenger crew. The crew consisted of Commander **Dick Scobee**, Pilot **Michael Smith**, Mission Specialists **Judy Resnik**, **Ronald McNair**, **Ellison Onizuka**, Payload Specialist **Gregory Jarvis** and Teacher in Space **Christa McAuliffe**. Truly went on to say, "In the 28 months since we returned to flight, the Shuttle has flown safely 13 times. The Shuttle's performance on every one of these flights has been outstanding, and flight safety has been the keystone of our success. Kennedy Space Center Director **Forrest S. McCartney** spoke center-wide via closed-circuit television to 18,000 employees during the fifth annual commemoration ceremony. McCartney said, "The entire work force has committed itself to doing everything we possibly can to minimize the risk associated with this type of operation. We've performed modifications on all three of the Orbiters to make them safer to fly." [Dowling, STAR-ADVOCATE, p. 3A, Jan. 23, 1991, Date, THE ORLANDO SENTINEL, p. A-12, Jan. 27, 1991, "Hunting for the Hunters of Challenger Debris," THE ORLANDO SENTINEL, p. A-12, Jan. 27, 1991, Banke, FLORIDA TODAY, Jan. 28, 1991, "Challenger Families Don't Want to Dwell On Negative Memory," THE

ORLANDO SENTINEL, p. 6A, Jan. 28, 1991, Halvorson, FLORIDA TODAY, pp. 1A-2A, Jan. 29, 1991. See Also: Glisch, THE ORLANDO SENTINEL, pp. A-1 and A-9, Jan. 28, 1991, Moore, THE ORLANDO SENTINEL, p. A-9, Jan. 28, 1991, and Gallagher, THE ORLANDO SENTINEL, p. B-3, Jan. 29, 1991, Dowling, STAR-ADVOCATE, p. 3A, Jan. 30, 1991.]



DISCOVERY: LEAKY STEERING THRUSTER

A one to four-day delay is expected in the launch of Discovery due to a leaky steering thruster discovered by technicians processing the Orbiter for its planned February 26 mission. The leak was found in one of 44 steering thrusters which are used by Discovery to maneuver while in orbit. These maneuvers are especially critical in Discovery's upcoming mission. Spare thrusters are available at Kennedy Space Center and the replacement operation is one which has been successfully completed by KSC technicians in the past. Two other thrusters might have to be replaced; one is suspected of leaking and the other is thought to have a bad weld. [Halvorson, FLORIDA TODAY, p. 1A, Jan. 29, 1991.]

January 29:

DISCOVERY GROUNDED TILL MARCH

The STS 39 mission aboard Discovery will be launched no earlier than March 7 because of problems with three of the Orbiter's jet thrusters, according to NASA spokesmen. Two of three steering thrusters are being replaced because of leaks and a third is being swapped out because of a bad weld. The thrusters are critical when an Orbiter makes its descent through the Earth's atmosphere. Discovery's transfer from the Orbiter Processing Facility to the Vehicle Assembly Building has been delayed until February 7. [Halvorson, FLORIDA TODAY, p. 8A, Jan. 30, 1991.]

January 30:

PLAYALINDA BEACH ROAD CONSTRUCTION

Construction on the \$3.9 million Playalinda Beach Access Road Project began last December and will be completed by 1993. The project includes the road itself, a four-mile stretch of NASA railroad and a new ranger station. Construction of the new access road will cause the closing for six weeks of the Max Hoeck Wildlife Drive. According to Canaveral National Seashore Superintendent **Wendell Simpson**, the Hoeck Drive will become the new route for access to the southern end of the seashore. National Parks Service Supervisor **Amy Schneckenburger** said, "This phase of construction involves filling and grading of road material as the contractor prepares the road to handle one-way traffic. Once the road has been widened, we will be diverting west-bound traffic from the beach onto the old wildlife drive so that construction of the new section of railroad can begin." The wildlife drive is expected to be reopened to traffic by mid-March. ["Road Construction Begins," STAR-ADVOCATE, p. 3A, Jan. 30, 1991.]



THRUSTER WORK BEGINS

Today Space Shuttle technicians will begin the simultaneous replacement of the

three suspect steering thrusters in Discovery, according to Kennedy Space Center spokeswoman **Lisa Malone**. "It will be the first time we've changed out three at the same time," she said. Installation is expected to be completed late tomorrow. The replacement thrusters were tested this week at KSC's Hypergolic Maintenance Facility. [Halvorson, FLORIDA TODAY, p. 8A, Jan. 31, 1991.]



SPACEPORT USA CLOSED TEMPORARILY

An abandoned backpack found at Spaceport USA occasioned the closing of Kennedy Space Center's visitor's center while security officers investigated the backpack. Ordnance experts gathered outside the attraction's main entrance at about 9:30 a.m. for the investigation. Spaceport USA was evacuated after specially trained dogs indicated the bag might be dangerous. KSC's spokesman **Mitch Varnes** said that a Czechoslovakian tourist, who did not respond to public-address announcements because he didn't understand English, returned to the area to reclaim his backpack shortly after its discovery. He emptied the pack for security officers, who determined there was no danger. The visitors center was reopened about 10:10 a.m., according to Varnes. "This would have been suspicious under any circumstances, but the heightened security out here [because of the war in the Persian Gulf] just amplified the situation. Everyone's more alert," Varnes said. ["Spaceport Officers Check Out Backpack," FLORIDA TODAY, Jan. 31, 1991.]

January 31:

SPACEPORT USA TOURS CONTINUE

An increased awareness of security considerations has been experienced at Kennedy Space Center due to recent military action in the Middle East. However, visitor operations at Spaceport USA have not been affected. Two hour bus tours of Kennedy Space Center continue at regular intervals throughout the day. Currently on display is Ambassador, a full-scale replica of a Space Shuttle Orbiter. The replica can be boarded to allow visitors an opportunity to see the working environment NASA astronauts experience aboard the Atlantis, Columbia and Discovery; it will be on display continuously through mid-April 1991. During January, Spaceport USA was visited by 184,004 persons which was 16% less than the January 1990 total of 221,106. [SPACEPORT USA PRESS RELEASE NTO581, Feb. 5, 1991.]

FEBRUARY

February 1: DISCOVERY'S THRUSTERS REPLACED

Discovery's three faulty steering thrusters were replaced today with new thrusters and testing of the units began at Kennedy Space Center. Two of the thrusters were replaced due to leaks and the third because of a bad weld. "We were pleased with the way the thruster change-out went," reported KSC spokeswoman **Lisa Malone**. "We're going to do some tests on the new thrusters this weekend. We should be through with all of this on Sunday." The thruster replacement caused the delay of the planned February 24 launch of Discovery on an eight-day Department of Defense mission. NASA also reported that filters in the waste management system were replaced on Discovery. The filters had deteriorated due to their age. Filters were also replaced on Atlantis and Columbia, said Malone. [Halvorson, FLORIDA TODAY, p. 2A, Feb. 2, 1991.]

February 2: GAMMA RAY OBSERVATORY

When the Gamma Ray Observatory arrives at the Vertical Processing Facility next week, it will carry 4,200 pounds of hydrazine - a record. "In my recollection, it's the largest hydrazine load that we've ever carried on a spacecraft," according to **Tom Breakfield**, Director of Shuttle Payload Operations. All of the spacecraft's systems will be tested by NASA technicians before the GRO is moved out to Launch Complex 39B where it will be installed in Atlantis's cargo bay. Later, a series of tests to verify electrical connections between the cargo and Atlantis will be conducted; liftoff is targeted for April 4, 1991. [Halvorson, FLORIDA TODAY, Feb. 3, 1991.]

February 3: DISCOVERY'S DOD MISSION

When Discovery launches in March it will be the first unclassified Department of Defense mission. The mission is devoted to collecting information needed to develop a space-based defense system. The Orbiter will act as an orbital observation post for celestial and manmade phenomena, but also as the subject of experiments. A free-flying science platform, part of the Strategic Defense Initiative, will monitor rocket firings, supply water dumps and other Orbiter activities. The STS-39 crew will arrive at Kennedy Space Center to participate in a two-day practice countdown presently scheduled for February 13-15, according to KSC spokesman **George Diller**. The crew is commanded by veteran astronaut **Mike Coats** and includes five space rookies. [White, FLORIDA TODAY, Feb. 4, 1991.]

February 4: NEW THRUSTER TO BE REPLACED

One of three new steering thrusters recently installed in Discovery may have to be replaced due to a faulty heater. The problem was uncovered in tests undertaken after the thrusters were installed. "We're evaluating why it failed and whether it can be repaired," said Kennedy Space Center spokeswoman **Lisa Malone**.

Managers will decide whether to replace the thruster tomorrow; replacement will force at least a 24-hour delay in moving Discovery into the Vehicle Assembly Building. The seven-man crew is expected to arrive at KSC for a two-day practice countdown February 13-15. [Halvorson, FLORIDA TODAY, p. 1B, Feb. 5, 1991.]



KSC CONSTRUCTION BUDGETED

The fiscal 1992 budget submitted by President Bush to Congress today includes millions of dollars for construction projects at Kennedy Space Center. "There's quite a bit going on down (at KSC) now, and I think you'll see us continue to improve the capabilities we have there," according to J. R. Thompson, NASA's Deputy Administrator.

KSC projects include:

- *Construction of a Space Station processing facility. The budget calls for an expenditure of \$35 million in 1992; NASA plans to award a \$56.2 million construction contract to Metric Constructors Inc. (Tampa, FL) over three years.

- *Modifications of a bay in the Vehicle Assembly Building. The proposed budget calls for \$7.5 million to so modify the bay that it can store Shuttle Orbiters when no room is available in the Orbiter Processing Facility.

- *Refurbishing the KSC crawlerway; the budget allots \$3 million to continue refurbishment of the surface of the crawlerway. The entire refurbishment is expected to cost \$10 million.

- *Restoration of Shuttle Landing Facility shoulders. The Bush budget calls for the expenditure of \$4 million to restore the shoulders of the 15,000-foot runway.

Speaking at a press conference, NASA Administrator Richard Truly said the overall NASA budget "provides for two significant new initiatives : a New Launch System jointly developed with DOD to provide a range of cargo capacities including heavy lift, and LIFESAT, a multi-launch recoverable biosatellite to help determine radiation protection requirements for long-duration space flight. The budget also proposes to initiate a new program, Assured Shuttle Availability, that will improve our ability to identify and incorporate high-priority improvements into the Shuttle. But the overwhelming majority of this budget - 99 percent - supports programs that have already been approved," Truly said. He went on to say that the budget increases are "required to begin implementing the recommendations set forth last December by the Advisory Committee on the Future of the U. S. Space Program, chaired by Norman Augustine...A number [of the Augustine Report goals] have already been implemented by NASA and others will follow. But it is important to remember that many of the most critical elements of the Augustine Report are resource-dependent and will require the support of Congress. [Hasson, FLORIDA TODAY, p. 8A, Jan. 31, 1991, Brown, FLORIDA TODAY, Feb. 1, 1991, Halvorson, FLORIDA TODAY, p. 4A, Feb. 5, 1991, Date, THE ORLANDO SENTINEL, p. A-6, Feb. 5, 1991.]

February 6:

DELTA LAUNCH DELAY

A payload problem may delay the launch of a Delta 2 launch vehicle for four to five days, according to Colin Cheeseman, INMARSAT Program Manager. The INMARSAT satellite is owned by the International Maritime Satellite Organization, a sixty-nation consortium. An electronics box failed during testing according to company officials. [Halvorson, FLORIDA TODAY, p. 7A, Feb. 7, 1991.]

February 7:

THRUSTER GLITCH THREATENS LAUNCH

The first launch of 1991 - Discovery's STS-39 mission - was threatened again with delay when a replacement steering thruster's heating unit failed a test today. The unit had been replaced to correct what was thought to be faulty wiring. Tests continued today to enable officials to decide whether the heater unit can be repaired or need to be replaced, according to Kennedy Space Center spokeswoman Lisa Malone. The extra work will delay Discovery's move from the Orbiter Processing Facility to the Vehicle Assembly Building. There is, additionally, a ripple effect from the delay in rolling Discovery over to the VAB; Columbia will remain longer in the high bay of the VAB and that lengthier stay threatens to delay its Spacelab mission. The major elements of Discovery's Department of Defense cargo were transferred from a satellite processing facility to Launch Complex 39A. The Gamma Ray Observatory was moved into the satellite processing facility to begin preparations for an April mission aboard Atlantis; the Atlantis crew is expected to fly to KSC at the end of the week to participate in cargo tests. [Halvorson, FLORIDA TODAY, p. 1A, Feb. 7, 1991, Banke, FLORIDA TODAY, p. 1A, Feb. 8, 1991, Date, THE ORLANDO SENTINEL, p. A-8, Feb. 8, 1991.]

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DISCOVERY PROCESSING UPDATE

KSC's Space Shuttle processing teams have nearly completed outfitting the Discovery for its upcoming flight (STS-39) scheduled for launch in early March. A visible step toward launch will occur when Discovery rolls over to the Vehicle Assembly Building atop the Orbiter transporter February 9. Since Discovery was rolled into the Orbiter Processing Facility on October 18, following the STS-33 Department of Defense mission, about 22 modifications have been implemented, including the installation of the five new general purpose computers. The new computers feature 2.5 times the memory capacity and up to three times the processing speed of the older units. Required tests and inspections were performed on the Orbiter's major systems while in the Orbiter Processing Facility. Discovery's three main engines, two orbital maneuvering system pods and the forward reaction control system were removed for testing or replacement. While in the VAB, Discovery will be connected to the external tank and solid rocket boosters, which are already bolted to the mobile launcher platform. The Shuttle Interface Test is scheduled to be conducted in the VAB. This test will verify the mechanical and electrical connections between the assembled vehicle elements. Next week, the STS-39 vehicle stack will be rolled to Launch Complex 39A where flight preparations will continue through launch. The launch day dress rehearsal

with the STS-39 launch team and flight crew, called the Terminal Countdown Demonstration Test, is tentatively planned for February 19-20. Launch of Discovery on the STS-39 mission is planned for early March, with a seven-member NASA crew. The primary objective of the eight-day mission is to conduct a variety of experiments for the Department of Defense and the Strategic Defense Initiative. The mission will end with a landing at the Dryden Flight Research Facility (Edwards, CA). [Malone, KSC NEWS RELEASE NO. 16-91, Feb. 8, 1991.]

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DELTA SATELLITE REPAIRED

A faulty electronics box which recently failed tests of an INMARSAT satellite at the Astrotech Space Operations payload processing plant (Titusville, FL) will be replaced. That clears the way for a March launch of a Delta rocket. The faulty unit was returned to its French manufacturer for repair; the repaired equipment is expected to be back at Astrotech next week, according to INMARSAT spokeswoman **Elizabeth Hess**. She said that the Delta 2 launch is expected no earlier than March 3. The INMARSAT satellite is virtually identical to a satellite launched aboard a Delta in October, 1990. It is the second of four second-generation satellites which will provide telephone, fax and data services to ships at sea, aircraft in flight and land transport vehicles. The satellite is built by British Aerospace; INMARSAT is a sixty country consortium which provides global mobile communications for maritime, aeronautical and land-based users. [Halvorson, FLORIDA TODAY, p. 5A, Feb. 8, 1991.]

February 9:

ROLLOVER SCHEDULED FOR DISCOVERY

The Space Shuttle Discovery is scheduled to roll three-tenths of a mile from the Orbiter Processing Facility to the Vehicle Assembly Building today where it will be mated with its external tank and solid rocket boosters. The stay in the VAB will be at least five days before rollout to Launch Complex 39A. Wiring in one of the Orbiter's steering thrusters must still be fixed, according to Kennedy Space Center spokeswoman **Lisa Malone**. Workers will make the repair when Discovery has been hoisted into a vertical position; the actual repair will either be done in the VAB or on the launch pad. [Banke, FLORIDA TODAY, p. 5A, Feb. 9, 1991.]

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COLUMBIA: ASTRO-1 REMOVAL

Workers this week plan to retrieve the Astro-1 Observatory from Columbia's cargo bay when the Orbiter arrives in the Orbiter Processing Facility. After the observatory's removal, technicians will begin processing the Shuttle for its next mission, a May Spacelab mission scheduled to last nine days. When it returns from the Spacelab mission, the Orbiter will be sent to a Rockwell International plant in Palmdale, CA, for extensive modifications. ["Orbiter Update," FLORIDA TODAY, p. 10E, Feb. 10, 1991.]

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DISCOVERY, COLUMBIA SWITCH PLACES

The Space Shuttles Discovery and Columbia swapped places with each other late

today at Kennedy Space Center. Discovery moved first from the Orbiter Processing Facility to the Vehicle Assembly Building, arriving at 5:10 p.m. At about 9 p.m. Columbia rolled out of the VAB and replaced Discovery in the OPF. The rotation is caused by the lack of hangar space at KSC; a third hangar might be available by the end of the year. Columbia still retains its cargo from its December 1990 mission, but it is due to be removed this week. Discovery will be mated with its external tank and solid rocket boosters February 10. The launch of Discovery remains scheduled for March 9. [Banke, FLORIDA TODAY, p. 2A, Feb. 10, 1991.]

February 10: DISCOVERY LAUNCH PREPARATIONS

Discovery must now undergo tests of its electrical and mechanical connections to be cleared for rollout to Launch Complex 39A which could come as early as January 14. If rollout occurs on this timetable, Discovery's Department of Defense cargo would be installed at the pad February 15. Discovery's seven-member crew is expected to arrive at Kennedy Space Center for a launch countdown demonstration test February 19-20; the crew will also receive training in emergency egress procedures. The Flight Readiness Review is scheduled for February 21-22 after which a firm launch date will be announced. The target date is March 9 at 3:49 a.m.; the countdown for launch begins three days earlier. There is little room in the schedule for dealing with hardware problems, though historically, Shuttle flights regularly slip one day for each week the Orbiter is on the launch pad. [Banke, FLORIDA TODAY, p. 1A, Feb. 11, 1991.]

February 12: DISCOVERY: CONNECTIONS TESTED

Critical connections between Discovery and its solid rocket boosters and external tank are being tested today through February 14, according to Kennedy Space Center spokeswoman Lisa Malone. Rollout is scheduled for 12:01 a.m. February 15. The wiring problem in one of Discovery's thrusters (see above) will be worked on by technicians during the Orbiter's stay in the Vehicle Assembly Building. [Banke, FLORIDA TODAY, p. 7A, Feb. 13, 1991.]

□ ADVISORY COUNCIL LETTER TO QUAYLE

In a letter to Vice President Dan Quayle, the NASA Advisory Council has praised NASA Administrator Truly and his management team "for taking quick, decisive and promising action" to implement the Report of the Advisory Committee on the Future of the U. S. Space Program. [Vincent, NASA NEWS RELEASE NO. 91-10, Feb. 12, 1991.]

February 13: WASTE VIOLATIONS COST EG&G

The State of Florida's Department of Environmental Regulation has fined EG&G Florida Inc. \$138,692 for nine violations ranging from accumulating hazardous wastes such as oil and paint in unapproved areas to failing to label hazardous waste containers. John White, an Environmental Specialist at DER in Orlando,

said, "Some of the violations sound fairly petty and some of them sound worse than they actually are, but it all reflects the management of the hazardous waste. If you find a lot of little things wrong, then somebody is not doing their job."

"Kennedy Space Center," White said, "has areas that have received State permits for storing hazardous waste. There is no excuse for them storing hazardous waste for more than 90 days in areas that are not permitted. If they are going to hold drums of hazardous waste in non-permitted areas and we don't penalize them for it, what is the incentive for somebody else to get a permit?" White added, "This the first time we've gone after EG&G. In the past, we've always sent the notices to NASA, but the federal government has sovereign immunity and we can't penalize them. In this case, we felt that EG&G has a contractual responsibility for managing all the hazardous waste on the space center. They are getting paid to do it, so we are penalizing them." EG&G spokeswoman Laurie Statmore said that the penalties were under review and that the company had not decided upon a course of action. KSC spokesman Dick Young did not offer a comment. [Halvorson, FLORIDA TODAY, p. 1A, Feb. 14, 1991.]



COLUMBIA GIVES UP ASTRO-1, FINALLY

The Astro-1 Observatory has been inside Columbia's cargo bay for nearly a year, but this week the observatory will be removed from the bay and transferred to a spacecraft processing facility for disassembly. The instruments belonging to the observatory will be stored in the event NASA decides to approve another Astro flight, according to Kennedy Space Center spokesman Mitch Varnes. While Astro-1 is being unloaded from Columbia, technicians continue to prepare Discovery for its March launch. Tests to verify electrical and mechanical connections between the Orbiter and its stack finished early today. Rollout to Launch Complex 39A is set for 12:01 a.m. February 15. [Banke, FLORIDA TODAY, p. 8A, Feb. 14, 1991.]

February 15:

DISCOVERY ROLLS OUT

Discovery began its rollout to Launch Complex 39A this morning at 12:43. The Orbiter made the six hour journey sporting a 15-foot-long yellow ribbon on the mobile platform in tribute to troops serving in the Persian Gulf. The move was delayed because of problems with ground-support equipment. Discovery set a post-Challenger record by staying only five days in the Vehicle Assembly Building prior to rollout. The extreme cold weather forecast for this weekend almost caused the move to be delayed further. An electronics box that controls the amount of power sent to a heater on one of the Orbiter's steering thrusters was not working properly. Lisa Malone, Kennedy Space Center spokeswoman, said that the thruster engines must be warmed if the temperature falls below 55 degrees. The delay was averted when portable heaters were installed at the pad to blow warm air onto the thrusters. The faulty electronics box will be repaired at the pad. Launch is tentatively set for March 9. [Banke, FLORIDA TODAY, p. 1A, Feb. 15, 1991, Banke, FLORIDA TODAY, p. 5A, Feb. 16, 1991.]



DISCOVERY READY FOR CARGO

Technicians today will load a Department of Defense payload into Discovery's cargo bay. When that installation is completed, preparations get under way for a practice countdown scheduled for February 19 and 20. Discovery's crew is expected to arrive at Kennedy Space Center February 18 to take part in the countdown demonstration test. Discovery's Ground Processing Manager **Chris Fairey** said, "If nothing breaks, we've got a real good chance" of making the March 9 launch date. [Banke, FLORIDA TODAY, p. 5A, Feb. 16, 1991.]

February 16:

WOODWARD WINS SNOOPY

NASA astronaut **Kevin Chilton** recently bestowed a Silver Snoopy award to **Brian Woodward**, a lead technician with Thiokol Corp. at Kennedy Space Center. Woodward's main duty is to direct the stacking of solid rocket booster segments in the Vehicle Assembly Building. The citation accompanying his award said his work "resulted in the increased overall efficiency of our technicians and provided a higher quality end product." "Booster Stacker Wins Silver Snoopy," FLORIDA TODAY, p. 9E, Feb. 17, 1991.]

February 18:

DISCOVERY CREW DUE TODAY

The seven astronauts who are crew members for Discovery's upcoming STS 39 mission are expected to arrive at Kennedy Space Center today. While at KSC, the seven will practice making emergency escapes from the launch pad; receive training in operating some of KSC's rescue equipment; fly practice landings in T-38 training jets and NASA's modified Gulfstream 2 jet with landings on the Shuttle Landing Facility. Commander **Michael Coats**, Pilot **Blaine Hammond** and Mission Specialists **Guion Bluford**, **Gregory Harbaugh**, **Richard Hieb**, **Donald McMonagle** and **Charles Veach** will all spend about two hours aboard Discovery during the Terminal Countdown Demonstration Test. Also today, pad workers will check Discovery's main engines for leaks using gaseous helium. [Banke, FLORIDA TODAY, p. 4A, Feb. 18, 1991.]

February 20:

VICE PRESIDENT AT KSC

Vice President **Dan Quayle** visited the Launch Control Center and inspected Discovery on Launch Complex 39A at Kennedy Space Center today. Quayle spoke to a gathering of about 2,500 KSC workers and outlined plans for a new launch vehicle that will fly initially without a crew, but will later complement the Shuttle in carrying people into orbit. "Our nation's launch capabilities are aging," he said. "It's time we have a new launch system. It's time we had technology that reflects the capabilities of the 21st century." The Vice President also spoke of equipment upgrades and a consolidation of Shuttle management at Kennedy Space Center. Quayle made a brief reference to the war in the Persian Gulf, remarking that **Saddam Hussein** "will get out of Kuwait one way or another." As the Vice President was preparing to board his plane at the Shuttle Landing Facility, the sound of an explosion caused his Secret Service bodyguards to move

Quayle back into his car. The noise, apparently, was due to an air hose which had accidentally popped loose from Quayle's plane during preflight servicing. [Brown, FLORIDA TODAY, p. 1A, Feb. 21, 1991.]



DISCOVERY ROLLBACK DECISION

"We really don't know what we're going to do," said Kennedy Space Center Director Forrest S. McCartney concerning the possibility that the Discovery may have to be rolled back into the Vehicle Assembly Building. That rollback decision may come tomorrow. Inspectors have found cracked hinges on two doors which cover an area where pipelines funnel fuel between Discovery's external tank and its three main engines. The cracks may keep the doors from closing completely after the external tank is jettisoned nine minutes after launch. If the doors cannot be closed properly a breach might result in the Orbiter's heat shielding which could damage or destroy the Shuttle during atmospheric re-entry. Three options are currently being considered: flying no earlier than March 9 with the cracked hinges if it is determined there is no threat to flight safety; reinforcing the hinges at the launch pad but not testing the repair at a cost of two or three days delay in launching the Shuttle and repairing and testing the hinges after a rollback from the launch pad. In order for the repair and full test of the hinges to be accomplished, Discovery would have to be demated and rolled over to the Orbiter Processing Facility. A decision to follow this latter course would delay the launch at least a month. [Banke, FLORIDA TODAY, Feb. 19, 1991, Banke, FLORIDA TODAY, p. 1A, Feb. 21, 1991, Banke, FLORIDA TODAY, p. 1A, Feb. 26, 1991.]

February 21:

COLUMBIA'S HINGES CRACKED, TOO

Columbia has the same sort of cracked door hinges as does Discovery, NASA said today. Engineers are attempting to devise a plan to test Columbia's hinges to determine whether it would be safe to fly Discovery March 9. The test calls for one of Columbia's good hinges to be slightly altered to resemble the way Discovery's cracked hinges would work in space. [Banke, FLORIDA TODAY, p. 1A, Feb. 22, 1991, Date, THE ORLANDO SENTINEL, p. A 2, Feb. 22, 1991, Brown, FLORIDA TODAY, Feb. 23, 1991, Date, THE ORLANDO SENTINEL, Feb. 23, 1991.]

February 23:

PAYLOAD WORKERS RECEIVE SNOOPYS

Payload workers Keith Amsden and Jim Hughes were presented Silver Snoopy Awards today by astronaut Mario Runco. Amsden and Hughes, both employees of McDonnell Douglas Space Systems Co., train employees who help prepare Defense Department payloads for Space Shuttle missions. ["Payload Workers Receive Astronauts' Highest Award," FLORIDA TODAY, Feb. 24, 1991.]



HOLLOWAY WINS DEBUS AWARD

McDonnell Douglas's Delta 2 Manager, Lyle Holloway, was today awarded the National Space Club's most prestigious award: the Dr. Kurt H. Debus Award. Holloway was the second recipient of the Debus Award, the first having been

George Page last year. Holloway has worked with the Delta launch vehicle program since 1962, when the rocket was an Air Force missile called Thor. He moved to Florida twelve years ago and was made Manager in Charge of the Delta 2 Team by McDonnell Douglas in 1985. ["Delta Manager Wins Kurt H. Debus Award," FLORIDA TODAY, Feb. 24, 1991.]

February 24: ENGINEERS STUDY DOOR HINGES

Engineers tested the Space Shuttle Columbia's doors today to determine how tight the doors would close even if the flawed part of the hinge failed. This test cannot be done on Discovery while it is on the pad. **Lisa Malone**, spokeswoman for Kennedy Space Center said that, "it may not be clear-cut, black-and-white that if doors don't close, we don't go. If everything proves it's OK to fly as is, we'll have the [flight readiness review] Wednesday. If not, there might be more tests so we can collect more data." [Brown, FLORIDA TODAY, Feb. 25, 1991.]

February 26: DISCOVERY DECISION DUE SOON

"It's looking like we're going to be able to fly [Discovery] as is," said Kennedy Space Center spokeswoman **Lisa Malone**. Malone remarked that with a simulated hinge failure, Columbia's doors worked properly. The February 28 Flight Readiness Review will focus on Discovery's cracked door hinges which were discovered during an inspection last week. Tests on Columbia, which has evidenced similar cracks, show that the flaw does not keep the doors from closing tightly against the Orbiter's underside. Meanwhile, work continues on preparing Atlantis for its April mission to deploy the Gamma Ray Observatory. There is evidence that an onboard steering thruster may be leaking; it will be retested. Atlantis' rollout to Launch Complex 39B is expected to take place March 9. [Banke, FLORIDA TODAY, p. 1A, Feb. 26, 1991, Brown, FLORIDA TODAY, Feb. 27, 1991, Date, THE ORLANDO SENTINEL, Feb. 26, 1991.]

February 27: DISCOVERY LAUNCH: NO FIRM DATE

The Flight Readiness Review, originally scheduled for February 28 and March 1 usually is the forum during which a firm launch date had been expected to be set for Discovery's STS 39 mission. That review has been postponed until March 4. **Richard H. Truly**, NASA Administrator, delayed setting the launch date and ordered the meeting postponed after a telephone conference February 26 failed to resolve safety concerns about Discovery's door hinges. "A number of people wanted to eyeball the data rather than do it by phone," said NASA spokesman **Mark Hess**. The astronauts' office, among other NASA offices, has asked for a review of engineers' analysis which said that the flight could be made safely. That conclusion was reached on the basis of tests done on Columbia's doors which have been found to have cracks similar to those on Discovery's door hinges. Johnson Space Center Director **Aaron Cohen** said, "There's a very high probability we'll fly as is." If NASA managers decide to roll Discovery back to the Vehicle Assembly Building the STS 39 mission would be delayed about a month, according to Kennedy Space Center spokeswoman **Lisa Malone**. [Brown,

FLORIDA TODAY, p. 1A, Feb. 28, 1991, Date, THE ORLANDO SENTINEL, p. A-11, Feb. 28, 1991.]

February 28:

ROLLBACK FOR DISCOVERY

"Prudence calls for us to roll back and fix it," said Associate Administrator for Spaceflight **William Lenoir** about NASA's decision to roll Discovery back to the Vehicle Assembly Building for repairs to its door hinges. "We were walking on a fine line. We concluded, 'Let's take a step on the safe side,'" he said. Lenoir went on to say that had there been a pressing need, NASA would have flown. He said, "If there was a national defense or some emergency reason why we needed to go fly, I don't think any of us would have any hesitation to go fly this bird. We're being conservative." Shuttle Program Director **Robert L. Crippen** said Discovery's launch should come in either late April or early May. [Center Director **Forest S. McCartney** told a meeting of the NASA History Advisory Committee which met at Kennedy Space Center March 12 and 13, that he expected the launch to come in late April.] The repairs will delay the STS 39 mission for at least a month. Kennedy Space Center Chief Engineer **Chester Vaughan** said, "Since we don't know exactly what happened to the hinge mechanism, it makes us feel a little bit nervous about the situation." Lenoir said engineers believed that one of the two-inch cracks in Discovery's door hinges occurred during a ground mishap when a signal was sent to one of the doors to close while it was latched open. Since no one is sure what caused the other crack, the agency chose the conservative route of caution. There are no spares for the hinges which are original Shuttle parts. [Brown, FLORIDA TODAY, March 1, 1991, Date, THE ORLANDO SENTINEL, March 1, 1991, McCartney Remarks to the March 12, 1991, meeting of the NASA History Advisory Committee at Kennedy Space Center; Leary, THE NEW YORK TIMES, p. A 14, March 1, 1991.]

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DELTA LAUNCH DELAYED

The launch of a Delta 2 rocket will have to be delayed until at least March 6 so a faulty electronics unit on the rocket's second stage may be replaced. "We've tested the new unit and everything looks good for Wednesday," said **Anne McCauley**, a spokeswoman for Delta manufacturer McDonnell Douglas Space Systems Inc. The Delta launch was to have been the first of 1991 due to the delay in launching Discovery. [Halvorson, FLORIDA TODAY, March 1, 1991.]

MARCH

March 1: DISCOVERY BORROWS HINGES FROM ENDEAVOUR

NASA said today that Discovery will be readied for an April 25 launch using door hinges borrowed from the newest Shuttle, Endeavour. NASA spokesman **James Hartsfield** called the repair decision, "not a long term-fix," but one which "will allow Discovery to fly its STS 39 mission." He went on to say that using Endeavour's equipment would allow engineers to remove the entire hinge mechanism from Discovery and learn more about what caused the cracks in the first place. Atlantis' hinges, whose cracks are thought not be as severe, will be repaired after its early April mission. Columbia's hinges will be modified before its May flight. Workers at Kennedy Space Center are currently making room in the Vehicle Assembly Building for Atlantis which will be rolled over on March 13 and for Discovery which will be rolled back March 14. [Brown, FLORIDA TODAY, p. 1A, March 2, 1991.]

□ TESTS DELAY DELTA LAUNCH

Launch of an international communications satellite aboard a Delta rocket has been delayed again to allow more time for tests of a faulty electronics box. The launch from Cape Canaveral Air Force Station is now scheduled for between 6 and 6:54 p.m. March 7, according to McDonnell Douglas Space Systems spokeswoman **Anne McCauley**. ["Delta Rocket Tests Delay Liftoff Again," FLORIDA TODAY, p. 1A, March 2, 1991, Halvorson, FLORIDA TODAY, p. 10E, March 3, 1991.]

□ LAUNCH/LANDING OPS CONSOLIDATION

NASA will investigate for four to six months the idea of consolidating Space Shuttle operations at Kennedy Space Center, making the launch and landing site the same. NASA Deputy Administrator **J. R. Thompson** said the agency is looking "very seriously" at the consolidation proposal which could cut the cost of operations by about 25 percent. Consolidation would mean getting Space Shuttle management together instead of having it spread among NASA headquarters, Marshall Space Flight Center in Huntsville, AL, and Johnson Space Center in Houston, TX. The proposal was recommended by the Advisory Committee on the Future of the Space Program on 10 December 1990. Thompson said that even though KSC can't offer the runway options and unlimited lengths that are available in the West, the wide, three-mile-long Shuttle Landing Facility at Kennedy Space Center proved to be more than adequate for the unscheduled 20 November landing of Space Shuttle Atlantis. [Space Calendar/February 25 - March 3, 1991, p. 4.]

□ WASTE DUMP PROPOSED NEAR KSC

The Florida Inland Navigation District plans to dump its dredging waste on a site at U. S. 1 and SR 405, the entrance to Kennedy Space Center because the area

is free of wetlands, islands and open water. The "black ooze" is sand, silt and much dredged from the bottom of the Indian River to make that river navigable. The dumping plan has been opposed by Titusville business leaders and by new Congressman Jim Bacchus (D-Orlando). Bacchus objected to the siting plan saying, "It's a prime piece of property in Brevard County. That is a site for which we have high hopes for the space industry." The land itself is part of a 95-acre tract owned by Hughes Aircraft Co. [Rowe, FLORIDA TODAY, p. 1B, March 2, 1991, Porto, FLORIDA TODAY, p. 1B, March 3, 1991.]



UNION APPROVES EG&G CONTRACT

The United Plant Guard Workers of America, Local 128, has ratified a three-year contract agreement with EG&G Florida Inc., base operations contractor at Kennedy Space Center, according to company spokeswoman Laurie Statmore today. Under the agreement, which expires November 1994, the union's 225 workers will receive an average pay increase of 4.1 percent, she said; she did not disclose the union's wage scale. Contract negotiations continue between EG&G and the Transport Workers Union, Local 525, which represents the company's 100 firefighters and other emergency service employees at Kennedy Space Center; their contract expires this month. ["Union Approves EG&G Contract," FLORIDA TODAY, p. 12C, March 2, 1991.]

March 3:

DISCOVERY, ATLANTIS SWITCH

Discovery's rollback to the Vehicle Assembly Building depends on how work is progressing on Atlantis which is scheduled to be rolled over to the VAB from the Orbiter Processing Facility. Before the transfer, Discovery must have its explosive devices disconnected and its onboard storage tanks drained. If work on Atlantis falls behind [see below], NASA managers will order Discovery's rollback to take place March 7. [Brown, FLORIDA TODAY, March 4, 1991.]



ORBITERS TO GET NEW FUEL LINES

NASA has just signed a \$27.6 million contract with Rockwell International Corp.'s Space Division to replace the 17-inch fuel lines in each Orbiter with new 14-inch lines. The new lines will have better seals and new flapper valves designed to prohibit a potentially catastrophic premature closure. ["Shuttles to Sport New Fuel Lines," FLORIDA TODAY, p. 10E, March 3, 1991.]

March 4:

ATLANTIS VAB MOVE DELAYED

The transfer of Atlantis to the Vehicle Assembly Building from the Orbiter Processing Facility has been delayed for a day because of an electrical power problem. That delay, however, will allow Discovery to be rolled back from the launch pad to the VAB for door hinge repairs. "We wanted to make the schedule flexible in case this happened, and it did," said Kennedy Space Center spokeswoman Lisa Malone. The electrical problem was identified over the weekend when Atlantis' electrical systems were being tested. Malone said, "It may

just be a software problem. If something comes up where it would be more prudent to stay in the Orbiter Processing Facility, then of course we'd do that." Rollback for Discovery is scheduled for 2 a.m. March 7. Replacement hinges for Discovery have been taken from the Space Shuttle Endeavour now in the final stages of construction in California. The hinges are expected to arrive at KSC either March 6 or March 7. [Brown, FLORIDA TODAY, p. 6A, March 5, 1991.]

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WEATHER STALLS DELTA LAUNCH

Bad weather at the launch pad at Cape Canaveral Air Force Station this past weekend again delayed the launch of an international communications satellite aboard a Delta rocket. That launch is now expected to come no earlier than March 8, according to McDonnell Douglas Space Systems Co. spokeswoman **Anne McCauley**. She said the launch window on the 8th will now be from 5:59 p.m. until 6:54 p.m. ["Inclement Weather Stalls Delta Flight," FLORIDA TODAY, p. 6A, March 5, 1991.]

March 5: ATLANTIS CRACK FOUND, TOO

A tiny crack in one of Atlantis' fuel line doors was detected after workers removed paint and saturated the area with dye. A repair decision will not be made until later in the week; the repairs would take two weeks. The crack is a quarter-inch long and less than a 1000th of an inch deep. Kennedy Space Center spokeswoman **Lisa Malone** said that earlier tests on Atlantis had failed to find the cracks because the fuel line doors were not completely open. [Brown, FLORIDA TODAY, p. 17A, March 6, 1991, Date, THE ORLANDO SENTINEL, p. A-3, March 6, 1991.]

March 6: HINGES WON'T DELAY ATLANTIS

NASA officials said that Atlantis will fly in April despite the discovery of two minute door hinge cracks. Kennedy Space Center spokesman **Bruce Buckingham** said, "Most folks feel these cracks have been there awhile and we've flown with them awhile." Another spokeswoman, **Lisa Malone**, said that "tests and analysis show that the cracks pose no threat to vehicle performance." The cracks found on Atlantis are about a quarter-inch long and less than a thousandth of an inch deep. NASA officials also said that, as a long-term solution, the agency will design a single, "beefier," forged part to replace the faulty door hinge part. [Brown, FLORIDA TODAY, p. 1A, March 7, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, March 7, 1991.]

March 7: DISCOVERY RETURNS FOR REPAIRS

Discovery made its return trip from the launch pad to its processing hangar early this morning. Repair of the cracked door hinges will take at least a month, delaying the STS 39 mission until late April or early May. Similar, though smaller, cracks have been found on both Atlantis and Columbia. Kennedy Space Center spokeswoman **Lisa Malone** said that engineering tests confirm that the tiny cracks

on Atlantis pose no problem during liftoff or flight. Atlantis' launch target of April 4 will likely slip a few days to allow workers to replace and test an electronics component which provides guidance information and repair four heat resistant tiles. Brown, FLORIDA TODAY, p. 1B, March 8, 1991, Malone, KSC NEWS RELEASE NO. 28-91, March 8, 1991.]

March 8:

DELTA LAUNCH SUCCESS

"What a beautiful sight as she lifts off," said McDonnell Douglas launch commentator Ray Adams about the 6:03 p.m. launch of a Delta 2 rocket from Cape Canaveral Air Force Station. An hour after the launch, the Delta's payload was deployed in geosynchronous orbit. The spacecraft, owned by the International Maritime Satellite Organization, is the second of a four-part network which will enhance mobile telephone, data transmission and voice message services to 30,000 INMARSAT users. The \$75 million INMARSAT will become operational in about six weeks. The last two satellites in the network will be launched later in the year by the European Space Agency. [Brown, FLORIDA TODAY, p. 9A, March 9, 1991, Date, THE ORLANDO SENTINEL, March 8, 1991, Date, THE ORLANDO SENTINEL, p. A-3, March 9, 1991.]

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ATLANTIS MOVES TO VAB

The Space Shuttle Atlantis was moved today from the Orbiter Processing Facility to the Vehicle Assembly Building where the Orbiter will be mated with its external tank and two solid rocket boosters. The launch of Atlantis and its mission to deploy the Gamma Ray Observatory has been from April 4 to April 5. The delay was due to the need to solve a problem with an electronics box, according to Kennedy Space Center spokeswoman Lisa Malone. Work continued meanwhile to prepare the Gamma Ray Observatory for its trip to the launch pad where it will be inserted into Atlantis' cargo bay. The GRO, which weighs 17-tons, will be the largest spacecraft ever carried by a Shuttle. Shuttle workers also began removing cracked parts from Columbia's door hinges. The hinges will be shipped to a Rockwell International facility in California where repairs will be made; the repairs are not expected to delay Columbia's May launch. Though cracks have been found in the door hinges of all three Orbiters, those found in Discovery were considered the most serious and will force NASA to roll the Shuttle back to the VAB. [Banke, FLORIDA TODAY, p. 9A, March 9, 1991.]

March 9:

SPACEPORT FLORIDA EMERGES

Ed O'Connor, Director of Spaceport Florida, has been in the Florida Capitol this past week drumming up support for the State's commercial space venture. "We're getting a tremendous amount of support," he said today. Legislation sponsored by Representative Charlie Roberts (D-Titusville, FL) will increase the authority's autonomy and give it more freedom in financial and political matters. Roberts said of the authority's present operating conditions, "If we want to pay a bill, we've got to send it to Commerce. That's such a stilted way of doing business. We don't want to be seen as a little subdivision." Roberts' bill would allow Spaceport

Florida to condemn property for construction projects, such as expanding its facilities; it would allow the authority to access money set aside for major education construction projects if the authority conducts a project with a state university; Spaceport Florida could sell tax-exempt bonds to raise revenue. [Nagy, FLORIDA TODAY, pp. 1B-2B, March 10, 1991.]

March 11: ATLANTIS ROLLOUT: MARCH 14

Atlantis was mated to its external tank and solid rocket boosters over the weekend and continues today to undergo electrical and connections tests in preparations for its rollout to the launch pad on the evening of March 14, according to Kennedy Space Center spokesman **Bruce Buckingham**. Liftoff is tentatively scheduled for April 5. Discovery has been returned to the Vehicle Assembly Building and will shortly be moved over to the Orbiter Processing Facility. Workers will begin demating Discovery from its stack March 12. [Banke, FLORIDA TODAY, p. 4A, March 11, 1991, Brown, FLORIDA TODAY, p. 5A, March 12, 1991.]

II CONTROLLED BURN AT KSC

The smoke which obscured the view of Kennedy Space Center from across the Indian River in Titusville, Florida, this morning was the result of a controlled burn undertaken to control the growth of unwanted vegetation, according to **James Clark**, law enforcement officer for the Merritt Island National Wildlife Refuge. He said that an area of marshland south of State Road 402 and along the Indian River was the target of the burn. ["Rangers Burn Refuge Vegetation," FLORIDA TODAY, p. 1B, March 12, 1991.]

March 12: CRACKS DISCOVERER HONORED

John Rice, employed by Lockheed Space Operations Co. at Kennedy Space Center, was awarded the NASA Flight Safety Award by Administrator **Richard H. Truly** today. "With his meticulous attention to detail, John Rice shows us the model of a Shuttle processing professional," said **Doug Sargent**, President of Lockheed Space Operations Co. Rice was the individual who identified the cracks in the door hinges on Discovery. Repair of those door hinges will delay the launch of the Orbiter until late April or early May. The Flight Safety Award recognizes individuals who make direct contributions to flight safety. [Halvorson, FLORIDA TODAY, p. 8A, March 13, 1991.]

March 13: ALS AND SPACEPORT FLORIDA

A proposed National Launch Development Center would be linked to Spaceport Florida and would lead research on new, less-expensive methods of preparing and flying space vehicles, including the Advanced Launch System. The Air Force and NASA have been working jointly on an ALS which would be supported by a \$25 million research complex in Brevard County, Florida. State Representative **Charlie Roberts** (D-Titusville) said, "This compares to the announcement that we're going to have a space center, that we're going to have an Apollo Program, that's

there's going to be a Space Shuttle." The proposed NLDC would help the government lower the cost of payloads and would provide commercial firms with a place to learn better ways to do business in the international marketplace. Col. Roger Colgrove, who heads the federal government's Advanced Launch Development Program, said, "From a government perspective, that's very important. From a commercial point of view, it's a matter of survival." Colgrove's group is trying to design both the ALS vehicle and its processing procedures simultaneously. He said, "What we want to do is get in early and find out what works and what doesn't." As currently envisioned, the research complex would be constructed with funds derived from the sale of Spaceport Florida bonds and would include a hangar large enough to hold a test vehicle the size of an external tank when it is horizontal. Plans also call for individual laboratories, an auditorium and computer centers and the entire complex would be available for use by government, industry and university researchers. [Brown, FLORIDA TODAY, pp. 1A & 2A, March 13, 1991.]

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GRO READY FOR PAD

NASA's Gamma Ray Observatory was ready this morning to be moved to Launch Complex 39B at Kennedy Space Center, according to KSC spokesman George Diller. The 17-ton observatory will make the ten mile journey to the pad in a 65-foot-tall cargo canister; the trip from the satellite processing facility will take 4 1/2 hours. Once at the pad, the satellite will be transferred to a satellite preparation room. Liftoff for Atlantis is scheduled for April 5. [Banke, FLORIDA TODAY, p. 8A, March 13, 1991.]

March 14:

NEW HINGE CRACKS

The replacement door hinge borrowed from Endeavour to enable Discovery to make its STS 39 mission has "the same design flaw" found on other Shuttles, according to NASA officials. The crack is sufficiently small that it is not expected to prevent Discovery's launch in late April or early May of this year. "It's not a big deal. It's certainly safe. It's a little bitty crack. Little starter cracks don't affect the operation, the structural integrity or anything. They make you scratch your head," said William Lenoir, Associate Administrator for Spaceflight at NASA. Lenoir was at Kennedy Space Center today for a meeting and press conference at the Press Site Dome. "It's something inherent in the design and that's what we have to change. We don't believe it's a manufacturing problem." NASA had planned to replace all four of Discovery's hinges with those taken from Endeavour, whose construction is nearly finished in California. The borrowing was necessary because there are no other replacements. The new hinges arrived at Kennedy Space Center last week. Meanwhile, there was a minor processing accident in the Vehicle Assembly Building before Discovery was rolled over to its hangar in the Orbiter Processing Facility. In the VAB, the Orbiter was being lowered to the ground; workers apparently misjudged the height causing Discovery's wheels to hit the ground too soon and bounce slightly. No damage was reported. [Brown, FLORIDA TODAY, p. 1A, March 15, 1991, Date, THE ORLANDO SENTINEL, March 15, 1991, "Crack Found in Substitute Shuttle Hinge," THE NEW YORK TIMES, p.

A13, March 15, 1991.]



DELAYS JUGGLE LAUNCH SCHEDULE

The delay in launching Discovery has caused a number of changes in NASA's 1991 schedule.

Revised 1991 Schedule

Shuttle	Mission	Payload	Date*
Atlantis	STS 37	Gamma Ray Observatory	April 5
Discovery	STS 43	TDRS-E Communications Satellite	April 25
Columbia	STS 40	Spacelab Life Sciences	May 25
Atlantis	STS 42	Tracking and Data Relay Satellite	July 25
Discovery	STS 48	Upper Atmosphere Research Satellite	September 19
Atlantis	STS 44	Defense Support Program	November 25

"The [Upper Atmosphere Research Satellite] has to be airborne before the end of December," said William Lenoir, NASA Associate Administrator for Spaceflight at a Kennedy Space Center press conference today. "One of the objectives is to catch the birth and formation of two cycles of the ozone hole forming over Antarctica in the wintertime. If the mission gets off after December, it misses one of the cycles." Delayed until January 1992 is the Spacelab International Microgravity Laboratory mission which had previously been set for December 1991. [Halvorson, FLORIDA TODAY, p. 2A, March 14, 1991, Halvorson, FLORIDA TODAY, p. 2A, March 15, 1991.]

March 15:

ATLANTIS ROLLOUT

"We have a big weekend ahead of us," said Kennedy Space Center spokesman Bruce Buckingham today after Atlantis was rolled out to its launch pad today. A number of tasks remain to be accomplished before the Orbiter is ready for its April 5 launch:

- (1) The Gamma Ray Observatory must be loaded into Atlantis' cargo bay; the 17-ton spacecraft arrived at the pad on March 13.
- (2) The five-member crew of Atlantis must arrive at the space center March 17 to take part in pre-launch training and briefings. The crew includes: Commander Steve Nagel; Pilot Ken Cameron; and Mission Specialists

Jerry Apt, Jerry Ross and Linda Godwin.

- (3) Pad technicians will check the three main engines of Atlantis for leaks and load fuel.
- (4) The launch pad will be cleared for a five-minute test firing of one of the Orbiter's auxiliary power units, necessitated by NASA rules. [Brown, FLORIDA TODAY, March 14, 1991, Banke, FLORIDA TODAY, p. 1A, March 16, 1991.]

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DISCOVERY LAUNCH DECISION

To fly or not to fly, that is the question which NASA will resolve about the Space Shuttle Discovery next week. The Orbiter has fuel line door hinges which are cracked; replacements for the door hinges will come from Endeavour which is now under construction in California. One problem: workers have found a tiny crack in one of Endeavour's door hinges; managers are also looking into the possibility of using door hinges from Columbia which are now being repaired for cracks, according to NASA spokesman **Bruce Buckingham**. [Date, THE ORLANDO SENTINEL, p. A-18, March 16, 1991.]

March 16: MCCARTNEY MEETS COMMUNITY LEADERS

Kennedy Space Center Director **Forrest S. McCartney** will host some 350 community leaders at Spaceport USA March 22. Activities will begin with a walk-through of an Orbiter mock-up and an 8:30 breakfast at the Orbit Cafeteria. At the meeting McCartney will discuss current plans and future programs of NASA; McCartney's remarks will be followed by a showing of the new IMAX film "The Blue Planet" and an optional tour of the space center. ["McCartney to Meet Local Leaders," FLORIDA TODAY, p. 10E, March 17, 1991.]

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QUAYLE CANCELS SPACE CONGRESS SPEECH

Vice President **Dan Quayle** canceled plans to speak to the 28th annual Space Congress (Cocoa Beach, FL) April 23-26. He had tentatively agreed to deliver the keynote address at the Congress, but said that other commitments forced him to cancel. Executive Secretary of the National Space Council **Mark Albrecht** will speak instead of Quayle. Other speakers at the Congress include Brig. Gen. **Jimney Morrell**, Commander of the 9th Space Wing at Patrick Air Force Base; **Arnold Aldrich**, NASA Administrator for Aeronautics and Space Technology; **Steven Hawley**, former astronaut and Associate Director, Ames Research Center; **Edward O'Connor**, Executive Director, Spaceport Florida Authority; Lt. Gen. **Thomas Moorman**, Air Force Space Command; **John Klineberg**, Director, Goddard Space Flight Center; Lt. Gen. **Donald Cromer**, Commander, Air Force Systems Division; **Barbara Morgan**, NASA Teacher-In-Space Designee; Col. **Michael Spence**, Commander, 655th Aerospace Test Group, CCAFS; **Richard Kohrs**, Director, NASA's Space Station Freedom Program. The Space Congress is sponsored annually by the Canaveral Council of Technical Societies. ["Quayle

Cancels Trip to Cocoa Beach; Albrecht to Address Space Congress," FLORIDA TODAY, p. 9E, March 17, 1991.]



ENDEAVOUR ENGINE PASSES TEST

The second of Endeavour's three main engines have completed acceptance tests at Stennis Space Center in Mississippi. When final inspections are completed, the engine will be shipped to Kennedy Space Center; the Orbiter Endeavour is expected to arrive at the space center in May. The first of the three main engines passed its tests at Stennis last year. The first flight of Endeavour is currently scheduled for May 1992. ["Endeavour Engine Passes Tests," FLORIDA TODAY, p. 10E, March 17, 1991.]



SHUTTLE CLOSES PLAYALINDA BEACH

Playalinda Beach at Canaveral National Seashore will be closed to the public until after the launch of STS 37 in early April. Atlantis is now on the pad and the access road to the beach falls within a three-mile security zone surrounding Launch Complex 39B. The beach will be reopened to the public within 24 hours of the launch, now expected to come on April 5. ["Shuttle Closes Playalinda Beach," FLORIDA TODAY, p. 1B, March 17, 1991.]



CAPE CANAVERAL PAD FACELIFT

Anti-rust repair work is underway at Launch Complex 17A at Cape Canaveral Air Force Station. "We probably won't get the whole tower done, but we're doing a permanent fix for the things we are doing," according to Lt. Col. Randy Moyer, Commander of the 1st Space Launch Squadron, the unit responsible for launching Air Force Delta rockets from CCAFS. "We'd like to get in to 17B and do similar work, but our initial look showed that pad 17B is not as bad as 17A," Moyer said. [Banke, FLORIDA TODAY, p. 10E, March 17, 1991.]

March 17:

ASTRONAUTS ARRIVE AT KSC

Bad weather at Kennedy Space Center and low fuel kept most of Atlantis' five-member crew from landing its T-38 planes at the Shuttle Landing Facility; they were diverted instead to Patrick Air Force Base. Commander Steve Nagel, Pilot Ken Cameron and Mission Specialists Linda Godwin and Jay Apt landed at PAFB; Specialist Jerry Ross who had more fuel in his T-38, waited aloft and landed at KSC about 7:15 p.m. Ross' four colleagues were driven to the space center and their T-38 planes were flown to KSC by other pilots. While at KSC, the crew will practice landing at the Shuttle Landing Facility and receive briefings about the status of Atlantis and, perhaps, inspect the cracked door hinges of the Orbiter. The hinges have been cleared for flight by NASA. The crew will also train for emergency escapes from the launch pad by driving an M-113 armored personnel carrier and participate in a practice countdown involving the entire Kennedy Space Center launch team. The Flight Readiness Review will be held beginning March 21. [Banke, FLORIDA TODAY, p. 1A, March 18, 1991.]



NEW SATURN V EXHIBITION FACILITY

NASA and TW Recreational Services have selected Morris Architects (Orlando, FL) to direct a design team to provide the conceptual plan for a major new KSC tour site involving the Saturn V rocket and other Apollo era artifacts. Morris Architects was chosen for contract negotiations to provide preliminary design concept drawings and specifications for the new Saturn V exhibit. The facility is planned for phased construction at an expanded Complex 39 Shuttle launch viewing site. Other members of the design team include: Waisman Dewar Grout Carter, Inc. (Vancouver, British Columbia); Bob Rogers & Company, Inc. (Burbank, CA); Levitan Design Associates (New York, NY); Glatting Lopez Kercher Anglin, Inc. (Orlando, FL); and TLC, Inc. (Orlando, FL). TW Recreational Services, Inc., which operates Spaceport USA for the Kennedy Space Center, will manage the contract leading to a conceptual design for an estimated \$30 million tour exhibit site. "This will be the most significant enhancement of the public visitor tour since its inception," said NASA Visitor Center Office Chief **Arnold Richman**. "This project will not only ensure the preservation of the major artifact of the Apollo-Saturn program, it will ensure that the human adventure of that period, the drama of this nation's commitment to the manned lunar landings, will be experienced and appreciated by future generations." The Saturn V rocket, one of only three actual flight vehicles left over from the Apollo program, is presently displayed at the southwest corner of the Vehicle Assembly Building parking lot; at that location, the rocket is exposed to long-term environmental threats to its preservation. The new exhibit facility will also include the Apollo lunar lander and the simulated Apollo-era firing room show currently housed at the Flight Crew Training Facility in the industrial area at the space center. The relocation of the Saturn V and Apollo artifacts into a covered facility at the new site, located about two miles north of the VAB, will ease traffic congestion caused by the high volume of bus tours. The project is expected to be paid for with revenues from bus tour ticket prices and will be built in phases beginning in 1993-1994. [Varnes, KSC NEWS RELEASE NO. 35-91, March 18, 1991, Meguiar, SPACEPORT USA RELEASE NO. NTO583, March 21, 1991.]

March 18: WATER IN ATLANTIS ENGINE COMPARTMENT

Weekend rains dumped ten gallons of water inside the Space Shuttle Atlantis' rear engine compartment. Officials said the water entered the compartment because temporary covers, not flight doors, are now affixed to the Shuttle. The water was mopped up and is not expected to delay the launch now targeted for early April. A Terminal Countdown Demonstration Test for Atlantis' STS 37 mission begins today and runs through tomorrow. Also today, workers began installing modified door hinges on Discovery; the hinges were taken from Columbia. Discovery's door hinges were removed so cracks found there could be studied. [Halvorson, FLORIDA TODAY, p. 2A, March 19, 1991.]



WHITE HOUSE BACKS SPACE STATION

"We need, and must build, a space station optimized for life science research as

our first major step into the last great frontier and adventure. We should not accept compromises of this ultimate goal," said **Allan Bromley**, assistant to President Bush. Bromley spoke following a meeting he attended of the National Space Council, chaired by Vice President **Dan Quayle**. The council's review was part of a unified effort to support a revised space station plan before Congress in early April. Bromley went on to say that he agreed science alone could not justify the station; scientific research and technology development, along with studies on the effects of microgravity on human beings, he said, do justify the expenditure of taxpayer dollars. [Halvorsen, FLORIDA TODAY, p. 1A, March 19, 1991.]

March 19:

ACCIDENTS SNARL KSC TRAFFIC

Traffic accidents involving ten cars held up rush-hour traffic at Kennedy Space Center this morning. The automobile accidents resulted in minor injuries to one woman, Evelyn Headrick, an employee of Pan American Airways. Ms. Headrick was treated and released from Parrish Medical Center (Titusville, FL). The accidents occurred at 6:45 a.m. in the eastbound lanes of the NASA Causeway over the Indian River. Three citations were issued by NASA security to drivers for unlawful speed and failure to use due care. One citation was issued for careless driving, according to NASA spokesman **Karl Kristofferson**. "It appears that some people were speeding and changing lanes on the bridge. Some cars were rear-ended and people just couldn't stop," said Kristofferson. He said the area was cleared for traffic by about 9:15 a.m. ["2 Accidents Snarl KSC Traffic," FLORIDA TODAY, p. 1B, March 20, 1991.]

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ATLANTIS CREW EXCITED ABOUT MISSION

The STS 37 crew met the press today at Kennedy Space Center and Commander **Steve Nagel** pronounced his crew "excited." Mission Specialist **Jerry Apt** added, "We've got an observatory that will look back to the beginning of time, and we'll be doing the first spacewalk in 5 1/2 years, so I think it's going to be great." The astronauts are at Kennedy Space Center to take part in the Terminal Countdown Demonstration Test and practice emergency egress procedures at the launch pad. The rest of the crew includes Pilot **Ken Cameron** and Mission Specialists **Linda Godwin** and **Jerry Ross**. Nagel said the crew was not concerned about the tiny cracks in Atlantis' door hinges. "On the basis of all the briefings and discussions we've had, I'm quite comfortable flying with these hairline cracks. They present no safety issue at all," Nagel said. Technicians at Kennedy Space Center today also prepared to move a Spacelab Life Sciences module into the Orbiters' processing hangar for installation in Columbia. Payload Manager **Mike Kinnan**, said the Spacelab module will be moved to the processing hangar and loaded into Columbia's cargo bay later this week. [Halvorsen, FLORIDA TODAY, p. 7A, March 20, 1991, Date, THE ORLANDO SENTINEL, March 20, 1991.]

March 20:

KSC SPACE STATION BUDGET CUTS

The restructuring of the Space Station Program is expected to cost Kennedy Space Center about twenty percent of its share of the program's budget, officials

said today. "We don't feel the cuts have been that significant," said KSC's Space Station Project Manager Dick Lyon. "Everybody feels there's [a] better chance of pulling the project off with its reduced size. People feel more positive about the program." Space Station project spending at KSC will be reduced from \$65 million to \$55 million, Lyon said. The overall FY 1992 KSC share was to have been \$85 million and that is expected to be reduced by \$10 million. The twenty percent cut will be felt through 1999, managers said. The Space Station Processing Facility will now house four instead of eight checkout areas. Harris Space Systems Corp.'s Project Manager Bill McCaslin said that cuts will be made to the company's contract to design the space station checkout system and to supply necessary equipment, but that a full estimate was not yet available. McCaslin did say that the cuts would come primarily in materials and not in design work. Harris employs some 260 people under its KSC contract. Construction on the SSPF is to begin next week and is not expected to be affected by the cuts. Other areas will be affected, however. A separate processing facility where hazardous materials were to be handled will be deleted. An Air Force complex will be used instead. Construction of a logistics facility will be postponed from the mid 1990s until 1999 and a maintenance depot's construction will be postponed indefinitely. Also postponed is the employment of additional workers to process space station hardware. [Brown, FLORIDA TODAY, p. 2A, March 21, 1991.]



WHITE HOUSE APPROVES SPACE STATION PLAN

Vice President Dan Quayle traveled to Capitol Hill today to endorse NASA's latest Space Station Program plan on behalf of the Bush Administration. "The question is," Quayle said, "is America going to lead the way to space? It's part of the American spirit to be pioneers. I am convinced the Congress will go ahead with the space station; it may take some encouragement." Director of the Office of Management and Budget, Richard Darman said, "Now what we need to do is build a base of enthusiastic support." Senator Barbara Mikulski (D-MD) said, "I think the Congress...is going to be committed to the redesign." [Groer, THE ORLANDO SENTINEL, p. A-2, March 21, 1991.]



COLUMBIA LAUNCH DELAYED

Columbia's STS 40 mission in May will be delayed at least a week, according to NASA officials, so workers can realign posts that hold solid rocket boosters onto the Shuttle's mobile launch platform. "There will be some hit to the schedule. We're talking several days rather than weeks or months," said Lisa Malone, Kennedy Space Center spokeswoman. "The whole [Shuttle] is resting on those posts," she said and noted that proper alignment of the posts is critical to a successful launch. Tests showed that the launch platform posts were improperly aligned. Two booster segments have been removed from the MLP to allow workers to begin making adjustments. The segments will be replaced March 23. [Halvorson, FLORIDA TODAY, p. 8A, March 21, 1991.]

GOOD COUNTDOWN SIMULATION

"We had a good simulation. There were no problems. We would have launched had it been the actual launch day," said Kennedy Space Center spokesman **Bruce Buckingham** of the just completed Terminal Countdown Demonstration Test. The Atlantis crew climbed aboard the Shuttle for the final three hours of the simulation today. Meanwhile, technicians continued testing replacement door hinges on Discovery. The hinges, taken from Columbia and modified, replaced cracked door hinges removed earlier from Discovery; the Orbiter is expected to be returned early next week to the Vehicle Assembly Building where it will be mated with its external fuel tank and twin solid rocket boosters. [Halvorson, FLORIDA TODAY, p. 8A, March 21, 1991, Date, THE ORLANDO SENTINEL, p. A-18, March 21, 1991.]

March 21:

NEW SHUTTLE SCHEDULE ISSUED

NASA managers today announced adjustments to modify the February 1991 Mixed Fleet Manifest. The modifications to the manifest were necessary after the STS 39 mission, scheduled for March with Space Shuttle Discovery, was postponed due to cracks on the Orbiter's external tank door drive mechanism housing. The flights now projected for calendar year 1991 begin with Space Shuttle Atlantis and the Gamma Ray Observatory flying in April. Following repairs to the door drive mechanism housing, Discovery will fly the STS 39 mission in May. The projected date for STS 40/Spacelab Life Sciences mission aboard Shuttle Columbia remains in May. Columbia will be taken off line as planned for structural inspections and modifications for Extended Duration Orbiter capability following completion of the STS-40 mission.

The Tracking Data Relay Satellite mission originally scheduled to fly on Discovery in July is now on Atlantis in August. The Defense Support Program mission remains on Atlantis but will move from August to December. These two adjustments preserve the agency's capability to fly Discovery with the Upper Atmosphere Research Satellite payload during its required science window with launch projected now for October. The International Microgravity Laboratory mission which was planned for December 1991 will become the first flight in calendar year 1992. The mixed cargo flight of the Tethered Satellite System and the European Space Agency's European Retrieable Carrier originally scheduled for February on Shuttle Discovery will move to August 1992 and will fly on Space Shuttle Atlantis. Flights in the mid-1992 time frame remain in their original manifested positions with Atlas-1 in April, the Intelsat reboost mission in May which will involve the first flight of Space Shuttle Endeavour and the U. S. Microgravity Laboratory in June. Spacelab-J and the mixed cargo flight of the U. S. Microgravity Payload and the Laser Geodynamics Satellite also remain as scheduled for September 1992. The Canadian Experiments payload also is joining this mission. Adjustments to the manifest beyond September 1992 are still being examined and will be announced later.

1991 Shuttle Launches

<u>Date</u>	<u>Mission</u>	<u>Vehicle</u>	<u>Payload</u>
April 1991	STS 37	Atlantis	GRO
May 1991	STS 39	Discovery	AFP 675/IBSS
May 1991	STS 40	Columbia	SLS-1
August 1991	STS 43	Atlantis	TDRS-E
October 1991	STS 48	Discovery	UARS
December 1991	STS 44	Atlantis	DSP

1992 Shuttle Launches

<u>Date</u>	<u>Mission</u>	<u>Vehicle</u>	<u>Payload</u>
February 1992	STS 42	Discovery	IML-1
April 1992	STS 45	Atlantis	ATLAS-1
May 1992	STS 49	Endeavour	INTELSAT-1
June 1992	STS 50	Columbia	USML-1
August 1992	STS 46	Atlantis	TSS-1/EURECA
September 1992	STS 47	Endeavour	Spacelab-J
September 1992	STS 52	Columbia	USMP/LAGEOS /CANEX

[Hess, Campion, NASA NEWS RELEASE NO. 91-44, March 21, 1991.]



SPACE STATION: CUTS COST JOBS

Cutting the cost and size of the Space Station Freedom will cost private industry a thousand jobs, according to NASA officials; no Brevard County Kennedy Space Center workers are expected to be laid off, though. Dick Lyon, KSC Space Station Project Manager, said that several hundred expected jobs will be either delayed or canceled. Associate Administrator for Spaceflight William Lenoir said, "The facts are in the fiscal climate in which we find ourselves today the proposed budget from last year was not attainable. We took the directions from Congress...to heart. We've cut costs, simplified the design and reduced the complexity of the project." He also said that Boeing and McDonnell Douglas are cooperating in renegotiating contracts which will cost Boeing to lose 500 jobs and McDonnell Douglas to lose 470 subcontractor jobs. "The companies," Lenoir said, "are on board. They are behind this." Lyon said that KSC will have its share

of the Space Station budget pared by about \$445 million through 1997 and more than half that amount will eventually be returned to the program once the Space Station is fully operational in 1999. He said that most of the KSC cutbacks come from putting of building and staffing warehouse and maintenance facilities. "Before the redesign," he said, "most of the Space Station hardware was to be delivered to KSC by 1997. That includes all the spares. We had to have a place to put it. Now, because the manufacturing stages have been stretched out, the companies can stock spares on site" until construction is complete. [Hasson and Brown, FLORIDA TODAY, p. 10A, March 22, 1991, Date, THE ORLANDO SENTINEL, March 22, 1991.]

□

SPACELAB MODULE DAMAGED

A processing accident at Kennedy Space Center caused damage to a Spacelab module scheduled for a May launch aboard Columbia. The launch is not expected to be postponed, however, because there is already a week's delay planned for realigning posts which hold the solid rocket boosters on the mobile launch platform. Workers were using a crane to lift the Spacelab module from a test stand in the KSC Operations and Checkout Building when the accident occurred, according to space center spokesman **Mitch Varnes**. Apparently, a worker mistakenly removed one of the three metal pegs used to hold the module in the test stand; the module tilted about 18 inches and banged into a tray full of electrical cables as it was being lifted. The accident caused a tear the size of a quarter and a 7-inch long scuff was noted in one of the Spacelab's insulating blankets. Varnes said that the blanket will either be repaired or replaced. He said, further, that managers still hoped to move the module into a Shuttle hangar and install it in Columbia's cargo bay this weekend. Booster segments on the mobile launch platform will be restacked starting this weekend. [Halvorson, FLORIDA TODAY, p. 10A, March 22, 1991, Date, THE ORLANDO SENTINEL, March 22, 1991.]

March 22:

RETURN ENTERPRISE: MCCARTNEY

"We ought to get Enterprise back down here. This is where it belongs," Kennedy Space Center **Forrest S. McCartney** told community leaders today at Spaceport USA. "I think having it sit in a hangar on the edge of Dulles (airport) doesn't serve the nation." Enterprise was located at KSC for four months in 1985 but was shipped to Dulles for housing in a National Air and Space Museum hangar in December 1985. The shipment occurred because of an agreement between the Smithsonian Institution (of which the museum is a part) and NASA; the agreement calls for hardware no longer needed by the space agency to be offered to the Air and Space Museum. Since 1985, Enterprise has been at Dulles awaiting congressional approval of a \$90 million appropriation to house both the Shuttle and other historic aircraft. "I don't think we'd loan it out," said **Martin Harwit**, Director of the Air and Space Museum. "We have never loaned Enterprise out because of the danger of transporting it. If we lost Enterprise, it would be a national tragedy." Enterprise was not built for spaceflight. It's entire career had been as part of Shuttle landing tests at Edwards Air Force Base (CA) in the late

1970s and as a pathfinder for tests at Shuttle launch pads both at KSC and at Vandenberg Air Force Base. Lin Ezell, Assistant Director for Collections Management at the Smithsonian, said that his institution had been contacted by officials at KSC to ask how the return of Enterprise to the space center could be arranged. "We don't make permanent loans," Ms. Ezell said. "But we do make finite loans, usually for five-year periods, that can be extended." Officials at the space center want to make Enterprise a center piece of a new \$30 million exhibit to be built at the Shuttle launch viewing site two miles north of the Vehicle Assembly Building. The facility is already slated to hold the Saturn V rocket now just outside the VAB; additionally, it would hold a lunar lander and a simulated Apollo-Era firing room now located in the Flight Crew Training Facility in the space center's industrial area. Speaking of the new facility, KSC's Arnold Richman said, "This will be the most significant enhancement of the public visitor tour since its inception. This project not only will ensure the preservation of the major artifact of the Apollo-Saturn Program, it will ensure that the human adventure of that period, the drama of this nation's commitment to the manned lunar landings, will be experienced and appreciated by future generations." [Halvorson, FLORIDA TODAY, pp. 1B-2B, March 23, 1991, SEE ALSO: March 17: New Saturn V Exhibition Facility.]

I

BETTER SAFETY REPORTS NEEDED

The Aerospace Safety Advisory Panel said in its annual report today that workers at Kennedy Space Center may fear punishment for reporting accidents. The panel said that better communication between managers and workers following incidents could eliminate the perception at the space center that disciplinary actions for errors are too severe. KSC Director Forrest S. McCartney said today: "I never have problems with any objective report about our operations here. We welcome constructive criticism as a way to make sure our operations remain effective, efficient and safe." The panel went on to say, "By overreaching, NASA has stretched its scientific, engineering and administrative capabilities excessively, thereby creating an environment where safety concerns compete with operational commitments, such as schedules."

Among the recommendations made by the panel:

- *Develop the ability to automatically land a Shuttle in case the crew is incapacitated.

- *Appoint boards to investigate "close calls" in addition to accidents, which already are probed.

- *Make sure there is an ample supply of hard-to-find spares for the Shuttle's aging and obsolete systems.

- *Develop a better spacesuit for space station astronauts. [Banke, FLORIDA TODAY, p. 1A, March 23, 1991.]

March 25:

ATLANTIS MAIN ENGINE TEST

"It's the last of our engine tests prior to launch," said Kennedy Space Center spokeswoman **Lisa Malone**, concerning a critical test of an Atlantis main engine which is to be conducted today. She went on to say that the test involves cycling engine valves, checking engine timing and calibrating various engine sensors. Meanwhile, key NASA and Shuttle contractors begin their Flight Readiness Review for STS 37 today; Discovery was towed from the Orbiter Processing Facility to the Vehicle Assembly Building for mating with its external tank and solid rocket boosters; rollout to Launch Complex 39A is expected to occur April 1. [Brown, FLORIDA TODAY, p. 1A, March 25, 1991, Halvorson, FLORIDA TODAY, March 26, 1991.]

March 26:

SPACE STATION FACILITY GROUNDBREAKING

Today NASA officials broke ground for construction of the \$70 million Space Station Processing Facility which will become the workplace for some 1400 persons at Kennedy Space Center. "The skyline around here is really going to change. This will be the biggest facility that we have built since the Apollo days" according to KSC Deputy Director **Gene Thomas**. The three-story, 457,000-square-foot facility will be completed in three years and will house laboratories, computer control centers and communications and electrical rooms. The facility construction will be undertaken by Metric Constructors (Tampa, FL) and will employ 500 people beginning next week. [Varnes, "Groundbreaking for KSC Space Station Facility Stated for March 26," KSC NEWS RELEASE NO. 32-91, March 14, 1991, Halvorson, FLORIDA TODAY, p. 1A, March 27, 1991, Date, THE ORLANDO SENTINEL, p. A-4, March 27, 1991.]

March 27:

STS 37 LAUNCH ADVISORY

NASA managers today set April 5, 1991, as the target date for Shuttle Mission STS 37. The launch date decision came at the conclusion of NASA's two-day Flight Readiness Review held at Kennedy Space Center. Spokeswoman **Lisa Malone** said, "The date's been set and we're marching forward. We've got a lot of work left, but we'll be ready to pick up the countdown next week." Countdown commences at 5:30 a.m. April 2; the astronauts arrive for the mission later that day. The five-member crew includes Commander **Steve Nagel**, Pilot **Ken Cameron** and Mission Specialists **Linda Godwin**, **Jay Apt** and **Jerry Ross**. This will be the 39th flight of the Space Shuttle system and will involve deployment of the Gamma Ray Observatory by the Shuttle Atlantis and its crew. The flight will also see the first "spacewalk" performed by Shuttle astronauts - Ross and Apt - since the return to flight in 1988. The "spacewalk" is the first of a series to prepare astronauts and ground crews for the construction and operation of the Space Station. The launch window on April 5 opens at 9:18 a.m. EST with the mission projected to last just over 5 days, with the landing expected April 10 at Edwards Air Force Base (CA). Shuttle Director **Robert L. Crippen** said, "The launch team has done a super job in getting us ready to fly STS 37. With the delay in Discovery and the STS 39, the team had a challenge to meet and they came through right on schedule."

[Campion and Malone, KSC NEWS RELEASE, March 27, 1991, Halvorson, FLORIDA TODAY, p. 1A, March 28, 1991, Date, THE ORLANDO SENTINEL, March 28, 1991.]

March 28: SPACESUITS ABOARD ATLANTIS

Preparations for the April 5 launch of Atlantis continued without a hitch today as spacesuits were packed aboard the Orbiter. The \$10 million suits will be used by spacewalking astronauts **Jerry Ross** and **Jay Apt**. Actually, three spacesuits - one as a spare - were installed in the Space Shuttle's airlock. The seven main components of the suits are: a hard vest known as an upper torso, a helmet, sleeves, gloves, pants, boots and a backpack with life-support systems. Each suit weighs about 270 pounds on Earth and a third of that weight is the backpack with its oxygen, radio, computer and a water circulation system to cool the outfit. The Launch Complex 39B has been closed except for essential workers to allow for the testing of explosive devices used to separate Atlantis from its solid rocket boosters and external tank. Onboard propellant tanks must still be pressurized in another hazardous operation. [Halvorson, FLORIDA TODAY, p. 4A, March 29, 1991.]

March 29: WINDS WORRY SHUTTLE MANAGERS

"We're not expecting the weather to interfere with work at the launch pad, but we'll keep a close eye out," said Kennedy Space Center spokeswoman **Lisa Malone**. She said that winds of 14 miles per hour would not be a great concern, but that stronger winds would cause technicians and safety officials to decide whether pad work could continue. She also said that thunderstorms and lightning expected on the weekend could halt some types of pad activities, especially those using electricity. Currently, the projected forecast calls for winds between 14 and 29 mph at Launch Complex 39B, where Atlantis is awaiting its April 5 five-day mission which is set to begin at 9:18 a.m. The STS 37 crew was isolated in crew quarters at Johnson Space Center (Houston, TX) and have begun getting adjusted to their onboard schedule which calls for them to wake each day at 2 a.m. [Banke, FLORIDA TODAY, p. 5A, March 30, 1991.]

March 30: HOLIDAY PAUSE AT 39B

The pad crew at Launch Complex 39B had the Easter weekend off from the work of preparing Atlantis for its STS 37 mission which is due to begin at 9:18 a.m. April 5. The countdown begins at 5:30 a.m. April 2; the crew arrives later that day. Kennedy Space Center spokesman **Karl Kristofferson** said of the holiday work schedule, "We're minimizing the number of people we have working on Easter Sunday. We'll only have a couple hundred people working at launch pad 39B." Meanwhile, in the Vehicle Assembly Building, workers are reading Discovery for its rollout early on April 1; launch for STS 39 is expected to come April 25. [Halvorson, FLORIDA TODAY, p. 6A, March 31, 1991, Banke, FLORIDA TODAY, p. 1A, April 1, 1991.]



SPACELAB TESTING BEGINS

Testing has begun on the components for the first International Microgravity Laboratory mission which is to be launched next February aboard Discovery. The mission will be the first in a series designed to bring together the resources of several space agencies around the world. Contributors to the mission are: the European Space Agency, the National Space Development Agency of Japan, the Canadian Space Agency, the French National Center for Space Studies and the German Space Agency. Current tests are to verify the compatibility of flight experiments with the Spacelab module. ["Spacelab Testing Begins," FLORIDA TODAY, p. 10E, March 31, 1991.]

March 31:

SPACEPORT USA ATTENDANCE

During the month of March 1991, 247,532 persons visited Spaceport USA; the year-to-date attendance stands at 651,017 visitors. Beginning April 11, the tourist attraction's hours of operations extend from 9:00 a.m. until 7:30 p.m. [SPACEPORT USA NEWS RELEASE NTO5084, April 1, 1991.]

APRIL

April 1: AIR FORCE BLUE TOUR RESUMES

The Blue Tour, discontinued for several weeks at Cape Canaveral Air Force Station due to the war in the Persian Gulf, will resume April 6, according to officials at Kennedy Space Center. The tour originates at Spaceport USA west of KSC and includes visits to Mercury and Gemini launch facilities, NASA's original mission control building and the Air Force Space Museum two hours later. Spaceport USA General Manager D. L. Hennessy said, "While we're glad to have the Blue Tour resume, its absence did not cause a major disruption of our visitor services. A majority of our visitor guests request the Red Tour of Complex 39, where the Space Shuttle is processed and launched." The Red Tour, which also starts at Spaceport USA, takes in historic sites at KSC. Spaceport USA will be open extended hours from 9 a.m. to 7 p.m. beginning April 11. ["Tour of NASA Sites Resumes After Hiatus," FLORIDA TODAY, p. 1B, April 2, 1991, "Historic Tour Operations Resume at Kennedy Space Center Spaceport USA," SPACEPORT USA NEWS RELEASE NT0584, April 1, 1991, "Tour of Launch Sites Resumes On Saturday," THE ORLANDO SENTINEL, April 3, 1991.]

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DISCOVERY ROLLS OUT, JOINS ATLANTIS

"Things couldn't be better," said Kennedy Space Center spokeswoman Lisa Malone about the fact that both Discovery and Atlantis are now on launch pads at the space center. Discovery completed its rollout to Launch Complex 39A by 9 a.m. today. At Launch Complex 39B, workers continued to prepare Atlantis for launch April 5 at 9:18 a.m.; weather concerns put the likelihood of an on-time launch at 50-50 due to the expected arrival of a cold front and rain. Launch controllers will be able to delay the liftoff until 1:56 p.m. before scrubbing for the day. Weather forecasts indicate that launch conditions increases to 80 percent favorable April 6 and 90 percent favorable on April 7. Tomorrow Atlantis' crew of Commander Steve Nagel, Pilot Ken Cameron, and Mission Specialists Linda Godwin, Jay Apt, and Jerry Ross arrives at the space center for two days of emergency landing practices and briefings. Bad weather prevented the U. S. Army's Golden Knight parachute demonstration team from making a planned jump over Launch Complex 39A; it was rescheduled for the following day. [Halvorson, FLORIDA TODAY, p. 1A, April 2, 1991, Date, THE ORLANDO SENTINEL, p. A-7, April 2, 1991, Sanchez, FLORIDA TODAY, p. 1A, April 2, 1991.]

April 2: SHUTTLE CREW ARRIVES

"Somebody told me not to say something as trite as 'We're ready to go fly.' But I couldn't think of anything better; we actually are ready to go fly," said STS Commander Steve Nagel, 44, when he and the rest of the Atlantis crew arrived at Kennedy Space Center today. Flying in formation aboard their T-38 training jets the crew of Nagel, Ken Cameron, Linda Godwin, Jerry Ross and Jay Apt touched down at the Shuttle Landing Facility about 3:45 p.m. The countdown for the mission began at 5:30 a.m. this morning and proceeded smoothly; NASA Test

Director **Al Sofge** said, "There's no bad news; things are looking good." Weather conditions have improved due to a delay in the expected arrival of a cold front on the Space Coast. The launch window on April 5 extends from 9:18 a.m. till 1:56 p.m.; by the close of the window there is expected to be a 90 percent chance of favorable conditions for launch. [Banke, FLORIDA TODAY, p. 1A, April 3, 1991, Hoversten, USA TODAY, p. 11A, April 3, 1991, Date, THE ORLANDO SENTINEL, April 2, 1991, Date, THE ORLANDO SENTINEL, April 3, 1991.]



PARATROOPERS AT KSC

The U. S. Army Parachute Team, also known as the Golden Knights, landed near Launch Complex 39A at 8:30 this morning. Their goal was to photograph a tight circle of eight paratroopers above the launch pad which is now occupied by the Space Shuttle Discovery. Lt. Col. **Kirk Knight** said, "We hope the photos will turn out good and everybody will enjoy a picture of the Army parachute team and the Shuttle." The jump had originally been scheduled to coincide with the rollout of Discovery but had been postponed due to high winds. The touchdown outside the pad's perimeter fence was marred by high winds which caused most of the parachutists to miss their precise marks. [Banke, FLORIDA TODAY, p. 1A, April 3, 1991.]

April 3:

EG&G, UNION AGREEMENT

KSC Base Operations Contractor EG&G Florida Inc. reached agreement today with members of the Transport Workers Union, Local 525, on a contract calling for a 4.1 percent annual pay raise and changes concerning break, meal and rest periods. At Kennedy Space Center, the Union covers 110 EG&G workers who are firefighters, fire technicians, fire inspectors, drivers, crew chiefs and paramedics. The contract, which runs for four years, expires March 31, 1995. ["EG&G, Union Reach Wage Accord," FLORIDA TODAY, p. 12C, April 4, 1991.]



WEATHER STILL A CONCERN

A strong low-pressure system moving toward Florida that is expected to bring rain showers or thunderstorms by Saturday could still impact April 5's launch because of winds gusting between 12 and 23 mph. Air Force weather watchers predict a 60 percent chance that weather will be favorable for the 9:18 a.m. liftoff; that is down 10 percent since yesterday. Chances are expected to improve nearer the close of the launch window at 1:56 p.m. The countdown, however, is proceeding uninterrupted. "It's basically a textbook countdown. As you know in this business, unforeseen problems can arise and cause major or minor glitches," said NASA Test Director **Al Sofge**. Today workers at Launch Complex 39B loaded liquid hydrogen and liquid oxygen into storage tanks aboard Atlantis; the two chemicals are used to provide electricity and drinking water aboard the Orbiter. **Steve Nagel** and **Ken Cameron** spent the day practicing emergency landings and joined the rest of the crew - **Linda Godwin**, **Jerry Ross** and **Jay Apt** - for an examination of crew equipment. [Banke, FLORIDA TODAY, p. 1A, April 4, 1991,

Wilford, THE NEW YORK TIMES, p. A9, April 4, 1991, Date, THE ORLANDO SENTINEL, April 5, 1991.]

April 4: ATLANTIS: READY FOR LIFTOFF

As liftoff for Atlantis' STS 37 mission approaches, Air Force meteorologists predict an 80 percent chance of favorable weather; it will be the first Shuttle launch of 1991. Pad technicians were to begin pumping liquid hydrogen and liquid oxygen into the Orbiter's external tank just after 1 a.m. tomorrow. The mission, which features the deployment of the Gamma Ray Observatory and the spacewalks by mission specialists **Jay Apt** and **Jerry Ross**, is expected to conclude April 10 with a landing at Edwards Air Force Base, CA. Pilot **Steve Nagel** will either utilize Atlantis' new brakes or try landing the Orbiter without braking on the north end of Rogers Dry Lake; it all depends on which way the wind is blowing. [Banke, FLORIDA TODAY, pp. 1A-2A, April 5, 1991.]

April 5: STS 37 LAUNCH A 'BEAUTY'

Liftoff of Atlantis was delayed four minutes this morning while launch controllers switched operations to allow them to execute an RTLS (Return to Launch Site) maneuver, if needed, from the opposite direction on the Shuttle Landing Facility at Kennedy Space Center. The change would have permitted enhanced visibility for such an emergency landing. Launch came, then, at 9:23 a.m. from Launch Complex 39B just as the clouds over the pad parted; in nine minutes the Space Shuttle was in orbit above the Earth. "We're off to a great mission. Today's a happy day for us, but we have a lot of work ahead," commented NASA Administrator **Richard Truly**; he also confessed an envy for the crew saying, "I wish I were on it." The STS 37 mission came just a week short of ten years after the launch of STS 1 on April 12, 1981. NASA officials said the tiny cracks on the door hinges of Atlantis posed no problem for the Orbiter during its liftoff. "We felt good about it, but it's an even you like to put behind you," said Shuttle Launch Director **Robert B. Sieck**. Two other problems surfaced during the ascent: a system, one of three, which cools the Orbiter's auxiliary power units was momentarily clogged with ice during liftoff and one of the Shuttle's 44 steering jets failed. The thruster's plumbing was thought to be clogged by engineers; orbiter maneuverability was not threatened because the remaining 43 steering jets evidenced no problems and can compensate the failed jet. Sieck also said, "The only thing we had to contend with was the weather." New visibility rules worked smoothly; they were instituted after a problem arose with the last Shuttle mission, Columbia's STS 35 flight. [Brown, FLORIDA TODAY, pp. 1A-2A, April 6, 1991, White, FLORIDA TODAY, p. 3A, April 6, 1991, Duryea, ST. PETERSBURG TIMES, pp. 1A-2A, April 6, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, April 6, 1991, Conway, THE ORLANDO SENTINEL, p. A-5, April 6, 1991, Haire, THE ORLANDO SENTINEL, p. A-4, April 6, 1991.]

April 9: TORNADO HITS NEAR KSC

Kennedy Space Center firefighters saw a tornado touch down about five miles

north of KSC, near Playalinda Beach. The sighting led to Brevard County's being placed under a tornado warning beginning at 9:20 p.m., according to meteorologist Gary Schmocker of the National Weather Service (Melbourne, FL). The warning ended forty minutes later, at 10 p.m. ["Twister Touches Down Near KSC," FLORIDA TODAY, p. 1B, April 10, 1991.]

April 11: ATLANTIS MISSION ENDS AT EDWARDS

A pinpoint landing in California marked the end of Atlantis' STS 37 mission; the flight lasted an extra day because adverse weather on April 10 delayed landing at Edwards Air Force Base for 24 hours. Commander **Steve Nagel** landed Atlantis on Edwards' Runway 33 at 9:56 a.m. EST. Astronaut **Brian Duffy** radioed Nagel saying, "Steve, you and your crew did it all and you made it look easy." Nagel responded, "It turned out to be a real humdinger." Johnson Space Center Deputy Director **Paul Weitz** pronounced the mission a success, "It was an eminently successful mission. We accomplished what we set out to do." [Banke, FLORIDA TODAY, p. 1A, April 12, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-16, April 11, 1991.]

April 12: STS 1, GAGARIN ANNIVERSARIES

Today is significant in space history for two reasons; thirty years ago the Soviet Union sent Cosmonaut Yuri Gagarin into space making him the first human being to travel into space; ten years ago the United States launched the Space Shuttle Columbia on the first-ever Shuttle flight, STS 1. [Brown, FLORIDA TODAY, pp. 1A-2A, April 12, 1991, "Soviets Use Anniversary to Boost Space Program," FLORIDA TODAY, p. 2A, April 12, 1991.]

□ DELTA 2 LAUNCH TODAY

"It would be great if we could get our rocket launched on the same day our friends at NASA celebrate the tenth anniversary of the first Shuttle launch," said McDonnell Douglas Space Systems Co. spokeswoman **Anne McCauley** about the expected launch today of a Delta 2 rocket carrying an American communications satellite to orbit. A technical review was conducted by launch managers yesterday and it was concluded that all systems were go for launch. Liftoff of the Delta 2 carrying its GTE Spacenet cargo is expected to occur between 6:31 and 8:41 p.m. and weather forecasts predict a 90 percent chance of favorable launch conditions. [Banke, FLORIDA TODAY, p. 8A, April 12, 1991.]

□ NATIONAL ASTRONAUT MEMORIAL

Two members of the U. S. Congress want the Astronaut Memorial at Kennedy Space Center designated as the National Memorial to Astronauts. U. S. Representative **Jim Bacchus** (D-Orlando, FL) and U. S. Senator **Jake Garn** (R-Utah) have filed legislation to that effect in the House and Senate; the identical legislation calls for the Astronaut Memorial currently under construction at Kennedy Space Center to be designated the national memorial for astronauts who

have died in the line of duty. Bacchus said, "This Astronaut Memorial helps us remember what has come before and reminds us of the bright future that space exploration offers to our nation and to all people. Above all, it reminds us of the risks involved in expanding the boundaries of exploration and knowledge and tells us that we must push forward despite these risks," he said. ["2 Lawmakers Call for National Astronaut Memorial," FLORIDA TODAY, p. 8A, April 12, 1991.]



DELTA LAUNCH SUCCESS

A McDonnell Douglas Delta 2, carrying a GTE communications satellite, was launched tonight at 8:09; the spectacular ascent was visible for miles. The launch itself was delayed for 42 minutes while company engineers in Huntington Beach, CA, analyzed information from weather balloons above the Cape Canaveral Air Force Station in Florida. Jean Davis, spokeswoman for GTE Spacenet (McLean, VA), said the launch was "terrific." Launch Commentator Ray Adams said, "A happy crew here in the mission director's office as spacecraft separation was confirmed." The \$40 million communications satellite, ASC-2, was built by GE AstroSpace Division and owned by GTE Spacenet. [Banke, FLORIDA TODAY, p. 5A, April 13, 1991, Date, THE ORLANDO SENTINEL, p. A-3, April 13, 1991.]



ATLANTIS: POST-LAUNCH INSPECTION

Post-launch inspection of the Space Shuttle Atlantis at Edwards Air Force Base (CA) show: (1) the Shuttle's heat protection tiles were damaged in at least 59 places, requiring about a dozen to be replaced; (2) slightly cracked hinges on two doors on the Orbiter's underside fared well during the mission; (3) a paper-thin piece of metal fell from Atlantis after the two doors were opened after landing. The metal strip was part of a system used to keep an electrical charge from building between the Orbiter and external tank; the strip is normally dropped off with the tank some nine minutes after launch, but it did not prevent the doors from functioning properly. [Banke, FLORIDA TODAY, p. 5A, April 13, 1991, Date, THE ORLANDO SENTINEL, p. A-5, April 13, 1991.]

April 13:

STUDENTS VIEW ATLANTIS LAUNCH

Students from North Carolina State University and North Carolina A & T State University were on hand April 5 for the launch of Atlantis STS 37 mission. The students recently completed a full-scale engineering research model of a proposed manned space vehicle, the HL-20, under an agreement between NASA's Langley Research Center and the Mars Mission Research Center, a cooperative effort between the two universities. The HL-20 is designed to transport people and cargo into low Earth orbit and would have conventional runway landing capability. The trip was sponsored by Rockwell International. The students from North Carolina State University were: Greg Alexopoulos, Michael Duncan, Jay Hardin, Robert Long, Alan Shepard, Joseph Steffen, Glenn Scott Tetterton, Kenneth Dean Driver, Don Vess and Robert Vess. Students from North Carolina A&T State University were Leslie Farley, Carl Jones, John Jones, Lasonja Lan,

Robert Williams, Dennis Hugley, and Thurman Exum. ["Students Treated to Shuttle Launch," FLORIDA TODAY, p. 9E, April 14, 1991.]

April 14:

HERCULES AEROSPACE CONTRACT

Hercules Aerospace has been awarded a contract worth between \$50 and \$100 million to provide upgraded solid rocket boosters for McDonnell Douglas Space Systems Co. Delta 2 rockets. The contract requires Hercules Aerospace to provide 117 boosters - 13 complete flight sets - in 1993 for Delta launches using 9 boosters each from Cape Canaveral Air Force Station. ["Hercules Wins Delta Contract," FLORIDA TODAY, p. 10E, April 14, 1991.]

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KSC OPEN HOUSE, ANNIVERSARY

Kennedy Space Center celebrated ten years of Space Shuttle launch history with an Open House for employees and their families; attendance was estimated at 30,000. The first Shuttle Pilot Robert L. Crippen, who is now Shuttle Program Director, spoke to the crowd saying, "That first launch [April 12, 1981] didn't come easy. There was a lot of blood, sweat and tears that went into it." STS 1 Commander John Young, also spoke to the crowd, "This is where the action has been for the last 30 years and where it will be for the next 130 years. The things the Space Shuttle has been able to do have been absolutely fantastic, but you all know about those." He said that KSC will have a continuing role in manned space flight in the years to come. Former KSC Director Richard Smith was also in attendance. He said, "I'm more relaxed than I was 10 years ago. It's hard to believe it's been that long. You look around and see all the same faces and realize what makes this place work are the people." [Banke, FLORIDA TODAY, p. 1A, April 14, 1991, "Shuttle Insiders Celebrate 10th Anniversary," THE ORLANDO SENTINEL, p. A-23, April 14, 1991.]

April 15:

DISCOVERY LAUNCH DATE SET

"We're ready to go and the Shuttle [Discovery] is ready to go," said Kennedy Space Center spokeswoman Lisa Malone in announcing the April 23 launch date for the Orbiter; the launch comes just 18 days after that of Atlantis. Discovery's launch window on the 23rd runs from 7:05 a.m. to 10:31 a.m.; countdown begins at 8:45 a.m. April 20. The seven-member STS 37 crew at about 6:30 p.m.; the crew includes Pilot Michael Coats, Pilot L. Blaine Hammond, Jr. and Mission Specialists Guion Bluford, Gregory Harbaugh, Richard Hieb, Donald McMonagle and Charles L. Veach. Meanwhile, launch preparations continue today at Launch Complex 39A; Discovery's computers are being loaded with mission programs and launch pad storage tanks are being filled with the liquid hydrogen and liquid oxygen which will be loaded onto Discovery prior to launch. Atlantis is expected to leave Edwards Air Force Base (CA) April 16 for a one-day flight to Kennedy Space Center, barring ill weather. A refueling stop has been scheduled for Kelly Air Force Base (TX); arrival at KSC should come at 6:30 p.m. [Banke, FLORIDA TODAY, p. 1A, April 16, 1991; Headline Radio News, 1350 a.m., April 17, 1991,

Banke, FLORIDA TODAY, p. 5A, April 13, 1991, Date, THE ORLANDO SENTINEL, April 16, 1991.]

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COUNTDOWN STANDARD SET

Shuttle Launch Director Robert Sieck was so pleased with the execution of the processing flow and the terminal countdown for the Gamma Ray Observatory mission (STS 37) that he says that it could establish the standard procedure for future flights: milestones were on target in virtually every sequence of events. He said the count never varied more than ten minutes and "was one of the best countdowns" he'd experienced. [Kolcum, AVIATION WEEK & SPACE TECHNOLOGY, p. 25, April 15, 1991.]

April 18:

WEATHER MIGHT STALL ATLAS LAUNCH

There is a 60 percent chance that weather will be favorable for launch of a General Dynamics-built Atlas 1 rocket tonight at 7:14. There is the threat of rain, however. The Atlas will carry a direct broadcast satellite into orbit for the Japanese Broadcasting Co.; the launch is paid for by General Electric. Charlie Lloyd, Vice President of General Dynamics Commercial Launch Services Inc., spoke about the prospects of his company in the commercial launch market saying, "In the long-term we see some very favorable things for our commercial launch business." The GE Program Manager Ron Maehl said, "It's a very important mission for us in the satellite industry because the Japanese direct broadcast market has really demonstrated the viability of this form of satellite communications." The satellite replaces one lost in an Ariane rocket failure last year. [Brown, FLORIDA TODAY, p. 1A, April 18, 1991.]

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BACCHUS: SPEND MORE ON SPACE

Freshman Congressman Jim Bacchus (D-Melbourne, FL) called for increased spending for NASA on space exploration and scientific research. "I believe there is unanimous agreement in this House that we must increase our competitiveness in the international marketplace," he said. "But how in the world can we profess a commitment to competitiveness when we fail to invest in one of the few technology areas in which the United States remains a clear international leader?" [Hasson, FLORIDA TODAY, p. 3A, April 18, 1991.]

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ATLAS-CENTAUR MALFUNCTIONS: LOST

Six minutes after launch at 7:30 p.m., an Atlas-Centaur rocket went out of control and had to be destroyed along with its multimillion dollar communications satellite payload. "It clearly was a disappointing event for us, but also for our customer," said Alan Lovelace, Chairman of General Dynamics Commercial Services, about the unsuccessful mission. The customer Lovelace referred to was the Japanese Broadcasting Co. whose satellite was destroyed. The Atlas rocket's first stage separated properly from its Centaur upper-stage at 4 1/2 minutes into its flight, but two minutes later only one of two Centaur rocket engines ignited causing a loss

of control, according to Mission Commentator **Skip Mackey**. The rocket was blown up on command by Air Force range safety officers to avoid danger to populated areas. Total cost of the launch, and spacecraft was \$100 million; the last previous Atlas Centaur failure came in March 1987 when lightning destroyed one of the rockets shortly after launch from Cape Canaveral. The launch had been delayed 16 minutes due to high winds over Cape Canaveral Air Force Station. General Dynamics is focusing its investigation into the failure on a problem with the rocket's engine. [Banke, FLORIDA TODAY, pp. 1A-2A, April 19, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-10, April 19, 1991, "Builder Suspects Engine Failure Spoiled Liftoff," THE NEW YORK TIMES, p. 6. April 20, 1991.]

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ATLANTIS RETURNS TO KSC, FINALLY

The return of Atlantis to Kennedy Space Center officially ended its Gamma Ray Observatory mission; the Shuttle arrived atop its 747 Shuttle Carrier Aircraft at the Shuttle Landing Facility at 9:37 a.m. The landing occurred just minutes before rain pummeled the KSC area. The Orbiter will be towed to the Orbiter Processing Facility tomorrow morning to be readied for a July mission to deploy a Tracking and Data Relay System satellite. Meanwhile, preparations for Discovery's launch April 23 continue without problems. NASA spokeswoman **Lisa Malone** said, "We're right on schedule and looking forward to a launch on Tuesday." Discovery's rear engine compartment was readied for launch today and the countdown begins April 20 at 8:45 a.m. The seven-man crew also arrives at Kennedy Space Center at about 6:30 p.m. [Banke, FLORIDA TODAY, p. 2A, April 19, 1991, KSC SHUTTLE STATUS REPORT, April 18, 1991.]

April 19:

COUNTDOWN READY TO START

"Everything's ready to go," announced Kennedy Space Center spokesman **Bruce Buckingham**; countdown for STS 39 is ready to proceed. The seven-man crew is expected to fly into KSC this evening at approximately 6:30 for final preparations for their eight-day Department of Defense mission. [Brown, FLORIDA TODAY, p. 6A, April 20, 1991.]

April 20:

DISCOVERY'S CREW ARRIVES AT KSC

"We're all excited to be here," said STS 39 Commander **Michael Coats** on his arrival today at Kennedy Space Center. "We're very, very proud of this flight. We think it's a tremendous challenge for NASA - probably one of the most challenging flights we've flown." Launch preparations continue to go well, according to NASA Test Director **Al Sofge**. "All we need is some good weather. If you know any prayers please say them, because we'll be anxious to climb in and just do it for one time," said Coats. The STS 39 crew also includes Pilot **Blaine Hammond, Jr.**, backup pilot **Don McMonagle** and Mission Specialists **Greg Harbaugh**, **Guion Bluford**, **Lacy Veach** and **Rick Hieb**. [Brown, FLORIDA TODAY, p. 1A, April 21, 1991, SPACE SHUTTLE MISSION STS-39 COUNTDOWN STATUS, April 21, 1991.]

HILMERS REPLACES CARTER IN '92 FLIGHT

Manley "Sonny" Carter, 43, was killed April 5 in a plane crash near Brunswick, GA, that also took the life of former U. S. Senator John Tower. Carter will be replaced aboard a 1992 Spacelab mission by veteran Shuttle astronaut David Hilmers. That flight is scheduled to launch in February 1992. In announcing the crew change, Donald Puddy, Director of Flight Crew Operations at Johnson Space Center, said, "It is with great regret that I have to make this selection under these circumstances. We all miss Sonny Carter; he was a special person and friend who can never be replaced." [Halvorson, FLORIDA TODAY, p. 4A, April 21, 1991.]

April 21:

LAUNCH FORECAST UNFAVORABLE

Shuttle Weather Officer Ed Prisela said today that almost every weather condition required for launch is threatened. There are low-altitude clouds which could block visibility; upper-level winds are predicted to be twice as strong as the area's normal 50-knot gusts; thunderstorm clouds which might provide lightning may blow over Kennedy Space Center April 23. Weather for Tuesday's launch of Discovery's STS 39 mission is forecast to be less than favorable with 70 percent chance of violating launch constraints at the opening of the window. There is a 60 percent chance of violating constraints throughout the entire three-hour, 26 minute window. A front located in western Florida and into the Gulf will probably produce low clouds and favorable conditions for showers. April 24's forecast calls for a 60 percent chance of violating launch constraints; April 25's forecast calls for a 40 percent chance of violation. Nevertheless, despite the forecasts, everything at Launch Complex 39A is continuing on schedule today as launch team members work toward the launch of the Space Shuttle Discovery at 7:05 a.m., April 23. The launch window extends through 10:31 a.m. The countdown clock came out of the T-27 hour planned eight-hour built-in hold on time this morning at 8:45. The clock will continue to count down until 4:45 p.m. today at which time it will enter another planned hold. Last night, April 20, final servicing of the STS 39 payload was completed and the payload bay doors were closed today at 8:30 a.m. At the pad today, the Power Reactant and Storage Distribution System on-board storage tanks are being serviced with liquid hydrogen and liquid oxygen reactants. The pad was cleared for this hazardous fueling operation at 9:00 a.m. Following PRSD loading operations, the Orbiter Midbody Umbilical Unit is scheduled to be retracted at about 4:45 p.m. today. Communication activation checks are targeted to begin about 9:00 p.m. The Rotating Service Structure is scheduled to be moved away from the vehicle at 11:45 a.m. April 22. The STS 39 flight crew arrived at Kennedy Space Center about 6:30 p.m. April 20; today the seven-member crew, already divided into two teams to accommodate a 24-hour in-flight work schedule, had their final medical exams and flew training missions in the Shuttle Training Aircraft and T-38 Trainer Aircraft. [SPACE SHUTTLE MISSION STS-39 COUNTDOWN STATUS, April 21, 1991, Brown, FLORIDA TODAY, p. 1A, April 22, 1991, Date, "Shuttle Slated to Go Tuesday, May Be Delayed," THE ORLANDO SENTINEL, p. A-14, April 21, 1991.]

April 22:

ATLANTIS LANDING NOT PERFECT

For the first time in 38 Orbiter landings, the Space Shuttle Atlantis put down 200 yards short of its lakebed runway at Edwards Air Force Base two weeks ago; the proximate cause was fluky winds and a late turn. There was no danger to the crew or the Orbiter because of the vast expanse of desert land in the area. At Kennedy Space Center, however, Atlantis would have had only 377 feet to spare on the 1,000-foot Shuttle Landing Facility. Shuttle Program Director Robert L. Crippen said, "We have taken some steps to see that we don't have that kind of action again." He said, nonetheless, that the Atlantis landing would not deter NASA from resuming regular landings at KSC next year. Landing at Kennedy Space Center will save NASA about \$1 million per flight in cross country transportation costs - once improvements to the Orbiters are fully tested. According to NASA spokesman Jeff Carr, Atlantis touched down 623 feet short of the runway markings on the Edwards runway due to a sudden wind shift and a slightly wide turn by Commander Steve Nagel. Carr said Nagel began his turn "a hair too late" and met a drastic wind shift from 105 mph out of the northwest to about 20 mph from the north. Carr went on to say that ground controllers were aware of the wind shift but failed to relay the information to Nagel because they did not know of Nagel's wide turn. "This is the first time we've encountered this kind of thing in wind speed," Carr said. Starting with the landing of Discovery's STS 39 mission, ground controllers will continually update astronauts on changing wind conditions through touchdown; in addition, Shuttle commanders will undergo additional training to help them deal with wind shifts. [Date, THE ORLANDO SENTINEL, pp. A-1 & A-5, April 23, 1991.]

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ATLAS ENGINE SHUT DOWN

Both of the engines on the ill-fated Atlas Centaur rocket ignited last week after launch, but one shut down causing the rocket to be destroyed over the Atlantic Ocean. "We are trying hard to determine what happened. Unfortunately, we'll never get the motors back," said Arthur Wegner, President of United Technologies' Pratt & Whitney. Until the failure on April 18, 178 Centaur engine had fired in space, all successfully, according to Pratt & Whitney. ["Two Atlas Engines Ignited, 1 Shut Down, Company Says," FLORIDA TODAY, p. 2A, April 23, 1991.]

April 23:

DISCOVERY'S LAUNCH SCRUBBED

A problem was found in one of Discovery's three main engines this morning at 1:15; launch will be postponed from two to five days. A transducer on a main engine turbopump failed just five-and a half hours before liftoff was to have occurred; NASA spokesman Joe McRoberts said liftoff may come no earlier than April 26. If not launched then, the mission must be postponed until next week because the payload must be reserviced after the 26th. Technicians must drain 528,616 gallons of fuel from the Orbiter before workers can enter the cramped rear engine compartment to attempt to pinpoint and fix the problem with the main engine. [Halvorson and Brown, FLORIDA TODAY, p. 1A, April 23, 1991, "Shuttle Discovery Launch Is Scrubbed," USA TODAY, p. 3A, April 23, 1991.]



EG&G AT SPACE CONGRESS

EG&G Fire Services personnel will be on hand at the Space Congress in Cocoa Beach through April 25 to demonstrate gear and equipment used by EG&G firefighters and by the launch pad crew at Kennedy Space Center. Also on display will be EG&G's new Document Imaging Processing System. ["EG&G at Space Congress," THE TRIBUNE, p. 4B, April 24, 1991.]



ALBRECHT AT SPACE CONGRESS

Mark Albrecht, Executive Secretary of the National Space Council, told the 28th Space Congress (Cocoa Beach, FL) that scrapping the \$30 billion space station program after it has undergone six years of development and four major design changes would seriously erode public support for future missions to the moon and to Mars. Albrecht delivered the Congress's Keynote Address as a stand-in for Vice President **Dan Quayle** who had a scheduling conflict. Albrecht welcomed debate, but called space station critics "confused." He said judging the space station by the number of experiments it can perform would be misguided. He said that argument would have derailed Christopher Columbus. Albrecht used the opportunity to speak to the Space Congress to pronounce the U. S. space program in "excellent condition, in a class by itself." He said much of the credit for the successful prosecution of the war against Iraq was due to the Global Positioning Satellites which aided allied troops in going through mine fields and kept soldiers in constant communications with their commanders. He said, "No other nation in the world could have done this. No other country has this capability." [Ash, FLORIDA TODAY, p. 1B-2B, April 24, 1991.]



DISCOVERY: FIVE-DAY LAUNCH DELAY

Discovery's STS 39 may be grounded as many as ten days while technicians and engineers work to solve an electrical problem which might have caused an in-flight engine failure. A longer delay would impact Columbia's STS 40 Spacelab mission. **Boyce Mix**, Deputy Manager of the space agency's Shuttle Engine Project Office, said of the problem, "This is a first for us and we don't really understand what happened. We're just going to have to go and see what we find." In the last hours before its scheduled liftoff, a pressure sensor in an engine turbopump failed. Technicians will also attempt to determine whether a wire harness and the engine's main computer need replacing. If only the sensor needs to be replaced, launch could occur April 28 between 7:01 a.m. and 10:21 a.m., Mix said. If the wire harness must be replaced, launch would be delayed until April 29 between 7:00 a.m. and 10:30 a.m. If the engine computer must be changed out, the launch delay could be the middle of next week or later. There are spare parts available for all three contingencies at Kennedy Space Center. When Discovery's problem appeared, engineers noted an incorrect reading from one of two sensors which measure pressure in an engine turbopump; the sensor improperly signaled a dangerous increase in pump pressures. That reading could have caused the Shuttle to shut off one of its main engines in-flight, requiring an emergency landing attempt at the Shuttle Landing Facility at KSC or one of two emergency landing

strips in Spain or in New Mexico. [Halvorson, FLORIDA TODAY, pp. 1A-2A, April 24, 1991, "Shuttle Delay," USA TODAY, p. 3A, April 24, 1991, Date, THE ORLANDO SENTINEL, p. A-1 & A-7, April 24, 1991.]

April 24: PROBLEMS FIXED; COUNTDOWN RESUMES

Countdown clocks at Kennedy Space Center will start up today at 8:45 a.m., looking toward an April 28 launch between 7:01 a.m. and 10:21 a.m. Replacement of two suspect parts in a Discovery engine cleared the way for restarting the countdown. KSC spokesman **Bruce Buckingham** said, "The team is confident we've solved our problem." The faulty parts - a sensor and a wire harness - were replaced today when technicians entered the Orbiter's engine compartment. Launch managers have three opportunities to launch Discovery - April 28, 29 and 30 -before its payload must be reserviced. If the payload must be reserviced there will be a further six-day delay. [Halvorson, FLORIDA TODAY, p. 1A, April 25, 1991.]

□ ENDEAVOUR DEBUTS IN CALIFORNIA

Endeavour, the replacement Space Shuttle for Challenger, rolls out of its Rockwell International assembly hangar (Palmdale, CA) today amid flag-waving ceremonies. "It's going to look very, very good coming out of the barn," said **John "Tip" Talone**, the KSC manager who is in charge of preparations for transporting Endeavour to the space center next week. The new Orbiter, which may be the last one ever built, has dozens of improvements over its three sister ships. It has a drag chute to make landings safer and allow them to take place routinely at Kennedy Space Center; Endeavour has upgraded navigation, steering and computer systems and it will be equipped to stay in space for up to 28 days. Rep. **Jim Bacchus** (D-Orlando) said, "Ideally I'd like to see us build another Orbiter. I also believe we need to expand the initial efforts to develop a new heavy lift launch vehicle. Realistically, we're going to be facing some very constraining budgetary situations that may make it very difficult to build another Orbiter." Endeavour is expected to arrive at Kennedy Space Center May 2. [Banke, FLORIDA TODAY, p. 1A, April 25, 1991, "Delayed Discovery Set to Go on Sunday," USA TODAY, p. 3A, April 25, 1991, "NASA Touts Its Latest Endeavour," THE ORLANDO SENTINEL, p. 1A, April 26, 1991.]

April 25: QUAYLE APPROVES BOOSTER PLAN

Vice President **Dan Quayle**, chairman of the National Space Council, has approved a \$10 to \$12 billion plan to develop and fly an new space booster that would fly in 1999. The new boosters would be based on the Shuttle's external fuel tank and propelled by up to six improved Space Shuttle main engines. The planned boosters are known as the National Launch System and would eventually replace the Space Shuttle, the military's Titan 4 and other expendable rockets. Congress has been asked to authorize \$350 million for the project, but Marshall Space Flight Center Director **Jack Lee** said, "Congress hasn't been very good to us so far." Lee added that if Congress approves the project, main engine

development would begin next year. Launch would be from a refurbished Space Shuttle pad at Kennedy Space Center and a new pad at Cape Canaveral Air Force Station. Lt. Gen. Thomas Moorman, Commander of the Air Force Space Command, said, "We envision a family of vehicles that serve a range of needs. NASA hopes plans to have the new launch system operational by the time Space Station Freedom is occupied by astronauts in 1999. The military plans on making use of the system in 2005; the Department of Defense and NASA will share development and management costs. Commander of the Air Force Space Systems Division, Lt. Gen. Donald Cromer, said the new launch vehicle should be more reliable, easier to operate and cheaper to fly than current expendable launchers. "We want to make the launch pad analogous to the end of a runway. You fuel and launch in a matter of hours or days, not weeks, months or even a year," he said. [Brown, FLORIDA TODAY, pp. 1B-2B, April 26, 1991.]



CALIFORNIA: ENDEAVOUR JOINS FLEET

The Space Shuttle Endeavour (OV-105) joined NASA's fleet of Orbiters today when it was rolled out of its California hangar to meet the press. NASA Administrator Richard Truly was on hand for the event and said, "Endeavour is a beauty, and in this case beauty is more than skin deep." The newest of the four Space Shuttles is a much improved model [see story dated April 24], but the primary difference between Endeavour and its sister ships is its ability to stay in space for up to 28 days, nearly three weeks longer than the longest Shuttle mission so far. Astronaut Dan Brandenstein, who will command the Orbiter's first mission in 1992, commented, "Endeavour is the jewel of the fleet." Executive Vice President of Rockwell International's Space Systems Division Sam Iacobellis expressed confidence that more Orbiters will be constructed, saying, "Shuttle Endeavour is the latest Orbiter, but it won't be the last." The Augustine Report has suggested, however, that Endeavour be the last Orbiter built. The newest Shuttle is expected to arrive at Kennedy Space Center on May 2 in time for the dedication of the Astronauts Memorial at Spaceport USA. [Halvorson and Banke, FLORIDA TODAY, p. 1A, April 25, 1991, KSC SHUTTLE STATUS REPORT, April 29, 1991.]



DISCOVERY COUNTS DOWN TO LAUNCH

Meteorologists for the Air Force today predicted a 70 percent chance that weather will cooperate with the April 28 attempt to launch the Space Shuttle Discovery at 7:01 a.m.; there is some concern about the possibility of thick, low-level clouds and rain showers in the area. Weather is expected to improve to an 80 percent favorable prediction by the close of the launch window at 10:21 a.m. The faulty sensor on Discovery was removed and another installed along with a new wire harness on April 24. The faulty sensor was flown to Marshall Space Flight Center for testing. "We proved that it was a bad sensor," said Kennedy Space Center spokeswoman Lisa Malone. [See story below.] Launch Complex 39A will be cleared of all but essential personnel April 26 while hazardous propellants are loaded onto the Space Shuttle. [Halvorson, FLORIDA TODAY, p. 2A, April 26, 1991, Date, THE ORLANDO SENTINEL, April 26, 1991.]



MSFC TESTS ON SENSOR, HARNESS

Space Shuttle Main Engine Project engineers at NASA's Marshall Space Flight Center have completed their initial examination and testing of the pressure transducer and the electrical wiring harness removed this week from the high pressure oxidizer turbopump of Main Engine number three aboard Space Shuttle Discovery. That transducer malfunctioned during Discovery's countdown April 23 in preparation for the STS 39 Department of Defense mission. According to Jerry Smelser, Manager of the Space Shuttle Main Engine Project Office, the transducer and harness arrived at Marshall Center April 24 and underwent tests, during which engineers were able to replicate the problem that occurred during tanking. "We know now that it was the transducer that caused the problem," Smelser said. "The faulty transducer was affected by the cold temperatures, a problem we haven't seen with transducers in any of the previous 39 Shuttle flights." He noted that low temperatures are present in the aft engine compartment during tanking due to the presence of cryogenics in the fuel. Smelser said the faulty transducer was being returned to its manufacturer for further testing to determine why the low temperatures adversely affected it. He indicated that both the transducer and the wiring harness have been replaced on Discovery, which is now being prepared for launch April 28. ["Tests Completed on STS-39 SSME Transducers," MSFC STATUS REPORT, April 25, 1991.]

April 26:

NASA READY FOR LAUNCH

"We're rarin' to go; right now, everything is proceeding as scheduled. We're actually a few minutes ahead of schedule. I don't see any problem with launching on Sunday," said Eric Redding, NASA Test Director. The countdown to launch proceeded smoothly through the loading of propellants April 26. Air Force meteorologists put the chances for launch at 80 percent with possible low clouds and rain showers the only constraints on the horizon. Meanwhile, technicians towed the Space Shuttle Columbia from the Orbiter Processing Facility to the Vehicle Assembly Building for mating with its external tank and solid rocket boosters in preparation for a May 24 launch on its STS 40 mission. [Halvorson, FLORIDA TODAY, p. 2A, April 27, 1991, Date, THE ORLANDO SENTINEL, April 27, 1991.]



MANNED SPACE FLIGHT ANNIVERSARY

Plans are on course for the 30th anniversary of manned space flight celebrations. Howard Benedict, Executive Director of the Mercury 7 Foundation, promises that the occasion is "going to be a big time." Mercury astronauts Alan Shepard, Scott Carpenter, Gordon Cooper and Wally Schirra will attend a May 9 ceremony dedicating the \$6 million astronaut memorial under construction at Spaceport USA. Among others, the astronaut memorial honors the memory of the late Mercury Astronaut Virgil "Gus" Grissom. On May 10, Shepard will speak at 11 a.m. at Cape Canaveral Air Force Station's Launch Complex 5 where his 15-minute spaceflight originated in 1961. This speech will begin a major effort to preserve and expand the Air Force Space Museum near LC 5. At noon, Shepard

will take part in a recreation of his 1961 countdown and the launch of a 1/14th-scale model of the Redstone rocket near the Kennedy Space Center headquarters. The public is invited to meet Cooper, Carpenter, Schirra and Deke Slayton at the U. S. Astronaut Hall of Fame outside the KSC gates near Titusville, FL. [Halvorsen, FLORIDA TODAY, p. 2A, April 27, 1991.]

April 27:

ORBITER UPDATE

Columbia is in the Vehicle Assembly Building at Kennedy Space Center, where technicians are attaching the Orbiters external tank and solid rocket boosters. The Shuttle is scheduled to be rolled to Launch Complex 39B by the end of the week with launch targeted for May 24 on its STS 40 mission. Atlantis is in Hangar No. 2 of the Orbiter Processing Facility where technicians are continuing post-flight inspections and tests. Atlantis is next scheduled for flight in July; the mission is STS 44. Endeavour, NASA's newest Space Shuttle, is to arrive at Kennedy Space Center on May 2. On arrival, the new Orbiter will be towed into the OPF for a brief stay, then be rolled over to the VAB for an extended stay until early August. ["Orbiter Update," FLORIDA TODAY, p. 10E, April 28, 1991.]

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FREEMAN WINS CONGRESS AWARD

This year's Space Congress Achievement Award was awarded to Roy Freeman (Cocoa Beach, FL), an employee with Rockwell International's Space Systems Division. He was cited for technical excellence and outstanding achievement in the military's launch of the Global Positioning Satellites, which are manufactured by Rockwell. The award was presented by John Latherow, Chairman of the Canaveral Council of Technical Societies, which sponsors the Congress. ["Cocoa Beach Resident Wins Achievement Award," FLORIDA TODAY, p. 9E, April 28, 1991.]

April 28:

STS 39 LAUNCH

"The most sophisticated mission we've launched so far," said Michael Griffin, Head of Technology for the Strategic Defense Initiative Organization when speaking of today's 7:33 a.m. launch of STS 39. Today's launch marked the eighth mission for the Department of Defense, but the first that was not secret. Griffin went on to say of the ambitious Pentagon mission: "It will tell us what our targets will look like in the space environment, the environment we would have to fight in." NASA Administrator commented on the launch, saying: "What a great way to end a beautiful month for the space program." This morning's launch came just 22 days after Atlantis was launched on April 6. The only time previously when two shuttles were launched in the same month was January 1986 when STS 61-C and STS 51-L were launched. NASA spokesman George Diller said, "We always had a long-term plan to have two vehicles flying from two (launch) pads. It's a comfortable feeling to be getting back to that." The launch of STS 39 today culminated five years of training and several delays for its crew. The mission had originally been scheduled for November 1990, but it was delayed due to the hydrogen fuel leaks which grounded the fleet for a large part of the year. A March 9 launch date

slipped after cracks were found in hinge mechanisms on two fuel inlet doors on the Orbiter's underside. Then, on April 23, the mission was scrubbed six hours before its scheduled launch because of a false sensor in an engine turbopump.

Today, the countdown proceeded smoothly, although launch was delayed 32 minutes due to a problem with a flight data recorder which turned itself on about 20 minutes before the scheduled 7:01 a.m. liftoff. "It acted like it had a mind of its own," said Robert B. Sieck, Shuttle Launch Director. The recorder was shut down and appeared to work perfectly after being reset, Sieck said. The countdown had been held to ensure that the Shuttle's computers did not send a false command to the recorder. An earlier problem with an Orbiter cooling system was resolved by using back-up equipment. The crew: Commander Michael Coats, Pilot Blaine Hammond and Mission Specialists Guion Bluford, Donald McMonagle, Richard Hieb, Charles "Lacy" Veach and Gregory Harbaugh rose for the traditional launch day breakfast of steak and eggs at 2:40 a.m.; they dressed and were driven to Launch Complex 39A at about 3:50 a.m. The mission is expected to last eight days, seven hours and 24 minutes with a scheduled landing May 6 at Edwards Air Force Base (CA). [Halvorson, FLORIDA TODAY, pp. 1A & 4A, April 29, 1991, Hoversten, USA TODAY, p. 6A, April 29, 1991, Broad, THE NEW YORK TIMES, p. A11, April 29, 1991, KSC SHUTTLE STATUS REPORT, April 29, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-5, April 29, 1991.]



BOOSTER RETURN UNDERWAY

The solid rocket boosters from the Discovery launch are being towed by the recovery ships to Hangar AF. They are scheduled to arrive at the Hangar at about 5 p.m. today. Safing the boosters is the first order of business. Afterwards, they will be inspected and washed down. Thermal foam and exterior cork will be removed with high pressure water. Disassembly operations are scheduled to take about ten days. [KSC SHUTTLE STATUS REPORT, April 29, 1991.]

April 29:

STS 40 PROCESSING

The STS 40 Shuttle Interface Test on the Orbiter Columbia began this morning. Mating with the external tank has been accomplished as have the electrical and mechanical connections between the vehicle elements and the launch platform. Rollout to Launch Complex 39B is scheduled to begin at 12:01 a.m. May 2; a Terminal Countdown Demonstration Test is scheduled for May 6-7 and the STS 40 Flight Readiness Review will take place May 13 and 14. [KSC SHUTTLE STATUS REPORT, April 29, 1991.]



STS 43 PROCESSING

Sniff checks of Atlantis' orbital maneuvering system motor valves has begun as have preparations to drain residual hypergolic propellants from the onboard storage tanks. Lube oil service for auxiliary power units has been performed and preparations have begun to remove the Orbiter's three main engines which will take place tomorrow. Stacking of the left aft booster, first booster segment for

STS 43, has begun in the Vehicle Assembly Building. Work completed includes removal of external tank umbilical housings; draining of the waste management system; main engine drying operations; removal of the remote manipulator system; replacement of the no. 3 fuel cell and replacement of window no. 1. [KSC SHUTTLE STATUS REPORT, April 29, 1991.]

April 30:

COLUMBIA PREPPED FOR ROLLOUT

The Space Shuttle Columbia will be rolled out to Launch Complex 39B at 12:01 a.m. May 2 in advance of its May 24 launch on its STS 40 mission. Today the electrical and mechanical connections between the Orbiter and its fuel tank and solid rocket boosters were checked. Atlantis is also being prepared for its next mission, STS 44. During preparations workers tried to open Atlantis' cargo bay doors while they were still latched shut; a motor which opens the doors ran for about three seconds when it was realized that the doors weren't moving and the motor shut off. Lockheed Space Operations Co. spokesman J. B. Klump reported no damage to Atlantis, but the company is considering disciplinary actions against the employees involved in the incident. [Brown, FLORIDA TODAY, p. 11A, May 1, 1991.]

MAY

May 1:

STS 40 PREPARATIONS

Columbia's pre-rollout preparations continue; the Orbiter is scheduled to be rolled to Launch Complex 39B starting tomorrow morning at 12:01. Today work platforms are being rolled away from the Shuttle and the crawler transporter is being readied for the trip to the launch pad. The Shuttle Interface Test to verify critical connections between the vehicle's elements and the launch platform has been completed as has installation of the external tank separation camera. Among the tasks to be accomplished at 39B are: launch pad validations; hot firing of one auxiliary power unit tomorrow night; the extension of the Rotating Service Structure about 4 a.m. May 3. This weekend technicians will conduct a Helium Signature Leak Test of the main propulsion system and the three Shuttle Main Engines; they will also conduct a main engine flight readiness test. The Terminal Countdown Demonstration Test is scheduled for May 6-7 and the Flight Readiness Review remains set for May 13-14. [KSC SHUTTLE STATUS REPORT, May 1, 1991, SEE ALSO: KSC NEWS RELEASE NO. 55-91, May 1, 1991.]

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WORK ON ATLANTIS FOR STS 43

Preparations continue to drain residual hypergolic propellants from the onboard storage tanks. Stacking of the second booster segment - the left aft center - is underway in the Vehicle Assembly Building as are routine inspections of the 17-inch disconnect. Installation of a fourth power reactant storage and distribution system tank has been set. Draining of residuals from the auxiliary power unit catch bottles proceeds as do preparations to replace a thruster on the right orbital maneuvering system pod and vent filters in the Orbiter's midbody. Completed work includes the removal of the three Shuttle Main Engines and sniff checks of the orbital maneuvering system motor valves. [KSC SHUTTLE STATUS REPORT, May 1, 1991.]

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ENDEAVOUR TRANSPORT PREPARATIONS

Endeavour is being prepared for delivery to KSC this week. Today, the new Orbiter is being mated to the new 747 Shuttle Carrier Aircraft using the Orbiter Lifting Frame. The first leg of the cross country ferry flight, from California to Texas, is scheduled to begin the morning of May 2. A refueling and overnight stop is planned at Ellington Field in Houston, TX. The journey, from Texas to Florida, will continue Friday. Pending favorable weather conditions, Endeavour's estimated time of arrival at Kennedy Space Center is noon May 3. Once demated from the 747, Endeavour will be towed to the Orbiter Processing Facility where the tail cone, ferry flight kit items, the two simulated orbital maneuvering system pods, and mock forward control system will be removed. Endeavour will then be towed to the Vehicle Assembly Building for powered down work. [KSC SHUTTLE STATUS REPORT, May 1, 1991.]

May 2:

COLUMBIA ROLLS TO PAD

The Space Shuttle Columbia headed for Launch Complex 39B last night at 11:26 and was hard down at the pad early this morning. A practice countdown for the nine-day STS 40 mission is scheduled for early next week. The crew includes: Commander **Bryan O'Connor**, Pilot **Sidney Gutierrez**, Mission Specialists **Tamara Jernigan**, **Margaret Rhea Seddon** and **James Bagian**, and Payload Specialists **Francis Andrew Gaffney** and **Millie Hughes-Fulford**. ["Columbia Moved to Launch Pad," FLORIDA TODAY, p. 6A, May 2, 1991.]

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TECHNICIANS MEMORIAL DEDICATED

Kennedy Space Center officials today officially dedicated a memorial to technicians killed while working at the space center. "People make the events happen here; hardware does not get processed by itself. We move around hazardous things, and all of this does not come without risk," said KSC **Forrest S. McCartney**. Seven persons' names are on the memorial located in the IMAX Theatre at Spaceport USA. The memorial features a bronze statue of an eagle, an astronaut helmet and a hard hat. Those listed are: **Forrest Cole** and **John Bjornstad**, who died in 1981 after entering the Space Shuttle Columbia's rear engine compartment while it was filled with gaseous nitrogen; **Sidney Dagle**, **Lot Gable** and **John Fassett**, who died April 14, 1964, when a solid-rocket motor they were working on ignited; **W. B. Estes**, killed May 16, 1968, at Launch Complex 39A after being struck by an unattached water line inadvertently subjected to high pressure; **Clarence Hailey**, who suffered a fatal fall on July 27, 1989, inside the KSC Utility Annex next to the VAB. Credited with persuading KSC managers to establish the memorial is retired Rockwell International worker **Guenter Wendt**. [Banke, FLORIDA TODAY, p. 6A, May 2, 1991.]

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MANLEY CARTER'S NAME ADDED TO MEMORIAL

The name of the late astronaut **Manley "Sonny" Carter** will be added to the Astronaut Memorial which is scheduled to be unveiled at Spaceport USA next week. "Everybody felt very strongly he met the criteria. He was on duty, going to give a speech representing the Astronaut Office," said Kennedy Space Center Public Affairs Director **Chuck Hollinshead**, who is on an advisory panel to the Astronauts Memorial Foundation which built the monument. Carter, was killed in an airplane crash on April 5 along with former Texas Senator **John Tower** and 21 others; the crash is currently under investigation. **Richard Truly**, NASA Administrator wrote a letter to the AMF urging that Carter's name be added to the memorial. AMF Chairman **Alan Helman** said, "We're pleased we're in a position to recognize Sonny. The memorial is designed to be able to add names as time goes on. Hopefully, we'll never have to do it again." Carter's name will be represented temporarily on the memorial by a gold star until it can be replaced with permanent recognition on the first anniversary of his death. [Brown, FLORIDA TODAY, p. 6A, May 2, 1991.]



ENDEAVOUR'S CROSS COUNTRY TRIP

Endeavour's departure from Palmdale, CA, has been delayed due to adverse weather in the flight path from California to Texas. The main concern today is turbulence over the Rocky Mountains. Endeavour will remain on the ground until conditions improve. Officials are keeping a close eye on the weather. The ferry flight could begin tomorrow morning [May 3] pending favorable weather conditions. Yesterday, the Orbiter was successfully mated to the new 747 Shuttle Carrier Aircraft. [KSC SHUTTLE STATUS REPORT, May 2, 1991.]



HOUSE OK'S NASA SPENDING

The U. S. House of Representatives voted 361 - 36 to approve a NASA budget of \$14.9 billion next year; the figure includes \$20 million for the Spaceport Florida Authority. President Bush had requested \$15.7 billion. The legislation provides a 10% increase over 1991. Among other items included in the legislation were: President Bush's full \$2 billion request for the Space Station in 1992. Melbourne Democrat Rep. Jim Bacchus commented on the bill's passage, "I'm especially happy with the strong support for the space station and also for the \$20 million launch improvements for the Florida Spaceport Authority." NASA has already expended \$5.5 billion on the Space Station Program and expects the total cost at completion to be \$24.5 billion. Rep. Barbara Boxer (D-CA), who heads the Government Operations Transportation Subcommittee, predicts the cost of completing the Space Station to be \$180 billion. [Hasson, FLORIDA TODAY, p. 9A, May 3, 1991, Crawford, THE ORLANDO SENTINEL, p. A-9, May 3, 1991.]

May 3:

ENDEAVOUR'S TRANSCONTINENTAL JOURNEY

The Space Shuttle Orbiter Endeavour, and its 747 Shuttle Carrier Aircraft touched down at Biggs Army Air Field near El Paso (TX) at 11:22 a.m. EDT to complete the first leg of its flight from Palmdale (CA) to the Kennedy Space Center. Weather conditions are not favorable for continuing the flight today and Endeavour will remain overnight at El Paso. At this time, weather conditions are somewhat marginal for continuing the eastern journey on May 4. Ferry flight managers have scheduled weather briefings this evening and again tomorrow morning before making a decision on proceeding on toward KSC. On its arrival at Biggs, workers noticed a small panel on top of Endeavour's crew cabin was open. The panel covers a T-shaped handle that, when pulled, pops off the two square windows on top of the Orbiter, giving the astronauts inside an emergency escape route. It is thought that the panel may have opened enroute to Texas, but there was no apparent damage and workers closed it. [SPACE SHUTTLE ORBITER ENDEAVOUR STATUS REPORT, May 3, 1991, Banke, FLORIDA TODAY, p. 5A, May 4, 1991, Banke, FLORIDA TODAY, p. 6A, May 5, 1991.]



KSC CLOSED TO PUBLIC ON MAY 9

The Kennedy Space Center will be closed to the public until 1 p.m. on May 9, for the dedication of the Astronauts Memorial, a tribute to the nation's astronauts who

have died in the line of duty. Only badged employees, news media and specially invited guests will be permitted into the center through the customary access points at Gate 2 on State Road 3 on the south end of the center and Gate 3 just off U. S. Route 1 two miles south of Titusville, FL. The dedication of the memorial is scheduled to begin at 11 a.m. Among the participants in the hour-long ceremony is Vice President **Dan Quayle**. The memorial was erected by The Astronaut Memorial Foundation on a six-acre site at Spaceport USA, the Kennedy Space Center's visitor center. To assure the dignity of the dedication, no vehicular traffic will be permitted on the NASA Causeway running past the visitor center from 10:45 a.m. until the conclusion of the ceremony. Normal traffic flow will resume at 1 p.m. Spaceport USA will open to the public shortly after 1 p.m. for bus tours of KSC. [KSC NEWS RELEASE NO. 56-91, May 3, 1991.]

May 4:

ENDEAVOUR MOVES MAY 5

The Space Shuttle Endeavour will remain on the ground at Biggs Army Air Field near El Paso tonight before continuing its cross country journey to Florida tomorrow. Current plans are for Endeavour to travel atop its 747 Shuttle Carrier Aircraft from Biggs to Kelly Air Force Base (San Antonio) as early in the day as central Texas weather will permit. Weather in that region is expected to clear by midday. A decision to continue the trip to Florida or to remain overnight at Kelly will be made based on further weather assessment and available time. At this time, Houston area weather is not expected to support an appearance at Ellington Field on May 5. Should Endeavour remain in San Antonio Sunday night, a decision will be made early May 6 on the routing of the flight for that day. [NASA NEWS RELEASE NO. 91-037C, May 4, 1991.]

May 5:

THE JOURNEY CONTINUES

The Space Shuttle Endeavour atop its 747 Shuttle Carrier Aircraft is expected to stop over briefly May 6 at Ellington Field (Houston, TX) on its way to the Kennedy Space Center, Florida. The reason for the detour to Ellington is that Johnson Space Center, the NASA field center responsible for the construction of the Orbiter, is near Ellington and officials there would like to give JSC employees a chance to see a Shuttle in their backyard, according to NASA spokeswoman **Barbara Schwartz**. Endeavour will arrive in Houston at approximately 10 a.m. CDT and remain until 2 p.m. before flying on to Columbus AFB (MS), where it will stay the night. Poor weather along the route has slowed the transcontinental trip from Palmdale, CA. The Orbiter and 747 have made stops at Biggs Army Air Field (El Paso, TX) and Kelly Air Force Base (San Antonio, TX) where it spent the night of May 5. At Kennedy Space Center, Endeavour will spend a year being readied for its first mission and will undergo extensive tests and inspections, according to KSC spokeswoman **Lisa Malone**. A few weeks before its first launch, the testing phase will culminate at Launch Complex 39B with a 20-second test firing of Endeavour's three main engines. Endeavour's Processing Manager **John "Tip" Talone**, said of the testing process, "The challenge at KSC is the turn-around processing of previously flown Orbiters with plenty of miles already on them. Processing a first flow of a brand new Orbiter, once you get it assembled and

everything ready to go, should be pretty smooth. We fully expect Endeavour will be that way." The assembly Talone referred to concerns the absence of parts from Endeavour which were removed for installation in the other three Orbiters as replacement for problem parts. Removing those parts prevented Rockwell International, Endeavour's manufacturer, from conducting some tests at the Palmdale facility. [Banke, FLORIDA TODAY, p. 6A, May 5, 1991, NASA NEWS RELEASE NO. 91-037F, May 5, 1991.]

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DISCOVERY LANDS TODAY

Discovery completes its STS 39 mission today at 2:50 p.m. EDT with a landing at Edwards Air Force Base (CA). Weather conditions at Edwards are predicted to be perfect. Discovery's orbital maneuvering engines will fire at 1:48 p.m. EDT to slow the Orbiter for its descent. Meanwhile, Endeavour, aboard its 747 Shuttle Carrier Aircraft will leave Kelly Air Force Base (San Antonio, TX) at 10 a.m. May 6 for a four-hour stay at Ellington Field (Houston, TX) and then fly to Columbus Air Force Base (Columbus, MS) for an overnight stay before proceeding to Kennedy Space Center on May 7 where it is expected to arrive before noon. At Kennedy Space Center today, Columbia's STS 40 crew of seven arrived to take part in May 7's terminal countdown demonstration test. [Banke, FLORIDA TODAY, p. 1A, May 5, 1991, Banke, FLORIDA TODAY, p. 1A, May 6, 1991.]

May 6:

HANG-FIRE ON JOUST/PROSPECTOR

An attempt was made today to launch the Joust/Prospector launch vehicle at 8:55 a.m. The ignition signal was sent, however, the motor did not ignite. The launch team is continuing the back-down procedure to save the vehicle. Once the vehicle has been safed, an investigation will be initiated to determine the cause of the hang-fire. The Joust/Prospector sounding rocket and its payload, worth about \$1 million, was scheduled to liftoff for a short suborbital trip into space and deployment of ten experiments. Manufactured by Orbital Science Corp.'s Space Data Division (Chandler, AZ), the vehicle is powered by a Thiokol Castor 4 motor. The small rocket would launch from the rail launcher at complex 20 which was last used by the Army's Starbird rocket last December. The launch would have been the fourth for the University of Alabama consortium, one of 16 NASA Centers for Commercial Development of Space. Three previous flights occurred in New Mexico. [Banke, FLORIDA TODAY, p. 1A, May 6, 1991, Joint Statement: University of Alabama in Huntsville; Orbital Sciences Corporation; NASA Office of Commercial Programs; U. S. Air Force, May 6, 1991.]

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DISCOVERY LANDS AT KSC

Discovery landed today at Kennedy Space Center at 2:55:36 p.m. EDT on Runway 15 after traveling 3.47 million miles around the world. The Orbiter's uneven landing - the seventh at KSC since the beginning of Shuttle flights in 1981 - caused damage to one tire, but KSC Director Forrest S. McCartney was optimistic about future Florida landings, saying, "We just hope they keep doing it. I look at it as a very positive step forward in the program." Flight controllers diverted the

landing to KSC because of higher than acceptable winds at Edwards Air Force Base, CA. Minutes after the approach of the Orbiter was announced by two loud sonic booms, the 106-ton Space Shuttle glided first north, then south to a landing on the Shuttle Landing Facility. From Mission Control in Houston, astronaut **Ken Bowersox** radioed to the crew: "Welcome back to sunny Florida, and congratulations on an outstanding mission." NASA Test Director **Rob Kelso** said, "The Shuttle's performance was nothing short of extraordinary. We accomplished just about everything that we went into space to do. We knew this flight was going to be ambitious and a real test of everyone involved. And I can tell you there is a deep satisfaction among the crew and everyone at NASA." Discovery was towed to Orbiter Processing Facility Bay 1 at 9 p.m. where post-flight deservicing operations are expected to begin shortly. [KSC SHUTTLE STATUS REPORT, May 7, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, May 7, 1991.]



STS 40 PROCESSING/SPACELAB

Preparations are underway to load hypergolic propellants onboard the Space Shuttle Columbia for its upcoming STS 40 mission. Propellants will be loaded into the Orbiter's orbital maneuvering system and reaction control system storage tanks. Auxiliary power units and solid rocket booster hydraulic power units will be serviced with hydrazine as part of this operation May 9. Work has also begun on applying foam to the solid rocket boosters' aft skirts. The Terminal Countdown Demonstration Test begins tomorrow (May 7) with a simulated main engine cutoff at 11:34 a.m. EDT. At the same time, the STS 40 crew have been completed emergency egress training exercises. Launch pad validations have been completed also. The Flight Readiness Review for STS 40 will occur May 13 and 14. [KSC SHUTTLE STATUS REPORT, May 7, 1991.]



STS 43 LAUNCH PROCESSING

Work in progress on the Space Shuttle Atlantis for its STS 43 mission includes checks of the main propulsion helium system and thermal protection system operations. Work remaining to be done includes auxiliary power unit leak and functional tests, power reactant storage and distribution system tests and tests of the Tacan System and S-Band Antenna. [KSC SHUTTLE STATUS REPORT, May 7, 1991.]

May 7:

LOW TROPHY FINALISTS

Eight finalists have been chosen for the 1991 George M. Low Trophy - NASA's Quality and Excellence Award. The finalists are:

EG&G Florida, Inc. (Kennedy Space Center, FL)
Grumman Technical Services Division (Titusville, FL)
Honeywell, Inc., Space and Strategic Systems Operations (Clearwater, FL)
Computer Sciences Corp., Applied Technology Division (Houston, TX)
Cray Research, Inc., Manufacturing Division (Chippewa Falls, WI)
Thiokol Corp., Space Operations (Brigham City, UT)
TRW Space and Technology Group (Redondo Beach, CA)
Unisys Space Systems Division (Houston, TX)

The award recognizes both NASA's prime contractors, subcontractors and suppliers for outstanding achievements in quality and productivity improvement and total quality management (TQM). Key goals of the award are to internalize quality and productivity practices and TQM processes throughout NASA and the agency's contractors and to transfer performance improvement methods of the award recipients to others. [NASA NEWS RELEASE NO. 91-70, May 7, 1991.]

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ENDEAVOUR'S ARRIVAL

The Space Shuttle Endeavour arrived, atop the new 747 Shuttle Carrier Aircraft, at KSC's Shuttle Landing Facility this morning at 9:28 a.m. EDT after the final leg of the five-day ferry flight. Welcoming the new Orbiter to Kennedy Space Center was its Director **Forrest S. McCartney** who said, "This is the home of the Orbiters. This is where they all roost. Isn't she pretty? The tile's all shiny and black. She's shiny all over. I just wish there was another one coming." Endeavour's arrival marks the first time since January 1986 that NASA has had four Orbiters at the Kennedy Space Center. KSC processing teams are scheduled to demate the Orbiter from the 747 by early this morning. Endeavour will be towed to the Vehicle Assembly Building overnight. Eventually the tail cone, ferry flight kit items, the two simulated orbital maneuvering system pads, and mock forward reaction control system will be removed. [Brown and Halvorson, FLORIDA TODAY, pp. 1A-2A, May 8, 1991, KSC SHUTTLE STATUS REPORT, May 7, 1991, Halvorson, FLORIDA TODAY, p. 2A, May 7, 1991.]

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DISCOVERY: POST-FLIGHT PROCESSING

Work is underway to offload residual propellant from the fuel cell storage tanks and to install access platforms in various areas including the aft compartment. The payload bay doors will be opened May 10 and post-flight inspections will commence. Thermal barriers between tiles will be replaced on the Orbiter's underside. About twice as many fillers as usual will have to be replaced because of over-temperature conditions experienced during the Orbiter's re-entry. Initial indications are that about 10 tiles will need to be replaced as a result of the over-temperature conditions. [KSC SHUTTLE STATUS REPORT, May 7, 1991.]

May 8:

DISCOVERY'S LANDING DAMAGED TIRES

Damage to Discovery's tires, according to NASA officials was due more to an off-balance landing than to a planned braking test. Landing at 240 miles per hour, Discovery's right landing gear touched down on Kennedy Space Center's Shuttle Landing Facility about 215 feet before the left gear touched the runway. Commander **Michael Coats** applied the Orbiter's new carbon brakes hard after the vehicle had traveled 6,136 feet down the 15,000 foot runway; the right-hand brakes were more vigorously applied than were those of the left gear. "The key was to demonstrate the landing capabilities on the Orbiters - the brakes and the steering, and to gain confidence in that new configuration," said KSC Launch Director **Robert B. Sieck**. In combination, these activities caused one of the Space Shuttle's tires to shred, according to NASA spokesman **James Hartsfield**. He said that three of the tire's 17 layers wore away; engineers say that the tire would have exploded if as many as ten layers had worn through. A new Shuttle tire, less susceptible to wear, may be available to the four-member fleet as early as December. Kennedy Space Center Director **Forrest S. McCartney** said, "It probably looked a whole lot worse than it was; it's not normal to go through the top few ply." Damage to the tire will not delay preparations for Discovery's next mission - STS 43, set for July - because the tires are routinely replaced between flights. Otherwise, inspections showed that the Orbiter returned from space in good shape, although the intense heat of re-entry did damage some tiles, according to KSC spokeswoman **Lisa Malone**. There was no danger to the vehicle or the crew, she said. [Banke, FLORIDA TODAY, p. 6A, May 9, 1991, Halvorson, FLORIDA TODAY, p. 2A, May 7, 1991, See story on May 7, Brown, FLORIDA TODAY, p. 6A, May 8, 1991.]

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COLUMBIA'S LAUNCH PROCESSING

Columbia will be ready for launch May 22, according to NASA managers. A minor accident in the Spacelab module which was discovered today will not delay the launch. A portable emergency oxygen bottle and mask had fallen from its mount into a safety net in the module. If a loss of pressure in the Spacelab occurred, the astronauts would make use of the oxygen as they evacuated the module. The Spacelab was not damaged; officials speculated that the bottle likely fell when Columbia was raised into the vertical position for mating. or during its rollout to Launch Complex 39B. [Banke, FLORIDA TODAY, p. 6A, May 9, 1991.]

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PROSPECTOR ROCKET INVESTIGATION

A second attempt to launch the 50-foot Prospector rocket at Cape Canaveral Air Force Station will not be made until the middle of next week, officials said today. Engineers require more time to understand why the Orbital Sciences Corp. rocket failed to ignite during the initial attempt May 6. Some of the ten experiments on board must be reserviced before the next launch effort. The cargo was removed today for that servicing. [Brown, FLORIDA TODAY, p. 2A, May 7, 1991, Banke, FLORIDA TODAY, p. 6A, May 9, 1991.]

May 9:

ASTRONAUT MEMORIAL DEDICATED

"We dedicate this monument to the memory of strong, courageous, smart and daring astronauts who pursued an adventurous dream and who died in peaceful service to their country," said Vice President **Dan Quayle** at a ceremony for the astronauts at Kennedy Space Center's Spaceport USA. "Think of what they might tell us if they were here today. I believe they would say, 'Carry on, America. Continue on our path. Live the dream. Build the future. That is what America will do. And like this inspiring space mirror that bears their names, our pioneering spirit and our willingness to dream will be our lasting tribute to them.'" A dedication plaque reads: "Whenever mankind has sought to conquer new frontiers there have been those who have given their lives for the cause. This Astronauts Memorial, dedicated May 9, 1991, is a tribute to the American men and women who have made the ultimate sacrifice, believing the conquest of space is worth the risk." Four T-38 training jets flew over the crowd attending the ceremony; one suddenly pulled away, leaving a hole in the formation. This "missing man" maneuver was NASA's tribute to the 15 astronauts who died on duty. The most recently deceased astronaut - **Manley "Sonny" Carter** - was to have flown in the formation before his fatal plane crash last month. Participants in the flyover maneuver were astronauts **David Hilmers**, **William Readdy**, **Stephen Oswald**, **Andrew Allen**, **Eugene Cernan** and **Ron Grabe**.

"I think it most appropriate to have the memorial located here at Kennedy Space Center, where the workforce not only can look at it and reflect on the sacrifices made, but also rededicate themselves to the work at hand," added KSC Director **Forrest S. McCartney** in his brief remarks to the crowd of 2,000 in attendance at the dedication ceremony. NASA Administrator **Richard H. Truly** and Astronaut Memorial Foundation Chairman **Alan Helman** also spoke at the ceremony. The monument is made of black granite and is called "Space Mirror;" it stands 42 1/2 feet tall and is 50 feet wide. It stands in front of KSC's Spaceport USA. The monument honors 15 astronauts, including **Manley Carter** who died last month. The others memorialized are the seven Challenger astronauts, three Apollo astronauts and four astronauts who died in training jet crashes. [See story below.] **Lorna Onizuka**, widow of Challenger astronaut **Ellison Onizuka**, said, "It reminds me of seeing the Shuttle at the launch pad at night. It's special in the sense that this is a memorial for all 15 families to share. A lot of them have had individual memorials and tributes, but I think this is nice in the sense that we now have all of their spirits together." **Ellen Jarvis**, whose stepson **Gregory Jarvis**, was killed in the Challenger accident, said, "This was a very overwhelming ceremony for us and we sincerely thank the people of Florida for making this possible." **Carl McNair**, whose son **Ronald McNair**, also died on Challenger, said, "A lot of fathers have lost sons and nothing good has come out of it. I look at this and I think of all the good that will come." Also on hand for the ceremony was **Grace Corrigan**, mother of Challenger astronaut **S. Christa McAuliffe**. [Brown, FLORIDA TODAY, pp. 1A-2A, May 10, 1991.]

MEMORIALIZED ASTRONAUTS

The fifteen astronauts killed in the line of duty and memorialized today on the Space Mirror are:

***Theodore Freeman, 34.** Killed outside Houston (TX) on October 31, 1964. Air Force captain and engineer.

***Elliot See, Jr., 38.** Killed in St. Louis (MO) on February 28, 1966. Engineer chosen as Gemini 9 command pilot.

***Charles Bassett II, 34.** Killed with See. Air Force captain and engineer chosen as pilot of Gemini 9.

***Clifton Williams Jr., 35.** Killed en route to Mobile, AL, on October 5, 1967. Marine major and engineer.

***Virgil "Gus" Grissom, 40.** Killed in Apollo 204 fire on the launch pad. Air Force lieutenant colonel and engineer. Mercury astronaut. Command pilot of Gemini 3.

***Edward White II, 36.** Killed in Apollo 204 fire. Air Force lieutenant colonel and engineer. Pilot of Gemini 4. Performed the first U.S. spacewalk in 1965 flight.

***Roger Chaffee, 31.** Killed in Apollo 204 fire. Navy lieutenant commander and engineer. Never flew in space.

***Francis "Dick" Scobee, 46.** Challenger astronaut. An engineer. Flew in space once in 1984. Commander of Challenger's last flight.

***Michael Smith, 40.** Challenger astronaut. Navy captain and engineer. Pilot for Challenger's final flight, his first.

***Ellison Onizuka, 39.** Challenger astronaut. Air Force lieutenant colonel and engineer. Flew in space once in 1985, STS 51C.

***Judith Resnik, 36.** Challenger astronaut. Engineer. Flew in space in 1984 on STS 41D.

***Ronald McNair, 35.** Challenger astronaut. Physicist. Flew in space in 1984 on STS 41B.

***S. Christa McAuliffe, 37.** Challenger astronaut. High school teacher, making her first spaceflight.

***Gregory Jarvis, 41.** Challenger astronaut. Engineer making his first spaceflight.

***Manley "Sonny" Carter, 43.** Killed in plane crash en route to a speech for NASA.

Flew on STS 33. ["15 Space Pioneers Gave Lives Over 30-Year Trek," FLORIDA TODAY, p. 2A, May 10, 1991, Liston, ASTRONAUT STATUS GUIDE, KSC Archives.]

May 10:

SHEPARD FLIGHT ANNIVERSARY

"Thank you again for a hell of a ride," Mercury astronaut **Alan Shepard** told a crowd of 200 near the Cape Canaveral Air Force Station site where his Mercury Redstone rocket lifted him into space 30 years ago today. Speaking at the occasion was **Ernie Malnassy**, a founder of the U.S. Air Force Space and Missile Museum. "The Air Force does not have enough construction money to build anything here to help preserve the exhibits. The history of our space program is going down the tubes," Malnassy said. Shepard agreed, "All of us aren't going to be around forever, and we're going to need to encourage youngsters to follow in our footsteps." A recreation of the Shepard launch was held using a model rocket and the event was attended by Shepard's Mercury colleagues: **Wally Schirra**, **Gordon Cooper**, **John Glenn**, **Scott Carpenter**, **Deke Slayton** and **Betty Grissom**, widow of **Virgil "Gus" Grissom**. The Gannett Foundation later in the day hosted a reception for the Mercury astronauts at **Bernard's Surf Restaurant** (Cocoa Beach, FL). The Mercury Seven Foundation, a nonprofit organization founded by the original Mercury astronauts, has awarded ten scholarships in science and engineering to the following persons: **James Moore**, **Deborah Swarts**, **Richard Pinehart, Jr.**, **Eric Sharpe**, **Kathy Shellenberger**, **W. Scott Tamblyn IV**, **Debora Fairbrother**, **Gregory Trenchalk**, **Edward Felten** and **Kevin Rutland**. [Banke, FLORIDA TODAY, p. 1A, May 11, 1991, "Mercury 7 Group Awards Scholarships," FLORIDA TODAY, p. 9E, May 12, 1991.]

May 11:

GENERAL DYNAMICS CONTRACT

NASA has awarded General Dynamics a contract worth \$112 million to launch a space science satellite from Cape Canaveral Air Force Station in 1995, the space agency announced. The rocket will carry NASA's Solar and Heliospheric Observatory to an egg-shaped orbit above Earth; the spacecraft's on-board propulsion system will then move the satellite into a position about one million miles from the Sun. The SOHO spacecraft will investigate the physical processes which form and heat the solar corona. ["General Dynamics Wins NASA Contract," FLORIDA TODAY, p. 10E, May 12, 1991.]

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LOCKHEED BOOSTER RECORD

Lockheed Space Operations Co. has set a new record for processing a Space Shuttle solid rocket booster stack at Kennedy Space Center; they have readied Columbia for launch in 22 days instead of the usual 26 or 27 days, according to company spokesman **J. B. Klump**. ["Lockheed Sets Booster Record," FLORIDA TODAY, p. 10E, May 12, 1991.]

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MICROGRAVITY LAB TEST

In Kennedy Space Center's Operations and Checkout Building, the International

Microgravity Laboratory has passed tests conducted by astronauts and ground controllers. The tests simulated conditions which will Spacelab will experience in space aboard Discovery early next year. According to Mission Manager **Robert McBrayer** of MSFC, "The payload - both the Spacelab elements and the experiment hardware - performed with minimal problems. The testing gave us very good information on the actual payload characteristics. We're comfortable that the systems and software are functioning properly." The mission's next milestone will come this fall when tests are conducted to insure the experiments are properly hooked up in their Spacelab carrier. The STS 42 crew includes: Commander **Ronald Grabe**, Pilot **Steven Oswald**, Mission Specialists **Norman Thagard**, **David Hilmers**, and **William Readdy** and Payload Specialists **Roberta Bondar** and **Ulf Merbold**. [Halvorson, FLORIDA TODAY, p. 9E, May 12, 1991.]

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JULIE BROWN WINS SNOOPY

Julie Brown (Cape Canaveral, FL) who works in Kennedy Space Center's Launch Control Center has been awarded a Silver Snoopy from NASA astronaut **Curt Brown**. She is responsible for producing and maintaining major customer review presentations and provides computer graphics support to several NASA and contractor organizations. ["Cape Canaveral Resident Wins NASA Silver Snoopy," FLORIDA TODAY, p. 9E, May 12, 1991.]

May 13:

FLIGHT READINESS REVIEW: STS 40

NASA began its Flight Readiness Review for Columbia's STS 40 mission today at Kennedy Space Center. Current schedules call for the Orbiter to be launched May 22; it will carry the Spacelab module with experiments aboard to research the effects of space on living things. The official launch date is traditionally set at the conclusion of the FRR. Meanwhile, launch preparations are continuing according to schedule. Ordnance has been installed on the Shuttle. [Banke, FLORIDA TODAY, p. 1A, May 13, 1991.]

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UARS ARRIVES AT KSC TODAY

NASA's Upper Atmosphere Research Satellite (UARS), scheduled to be launched aboard the Space Shuttle Discovery's STS 48 mission this fall, is scheduled to arrive at Kennedy Space Center today. UARS was shipped by barge down the Atlantic coast from Salem, NJ, by the spacecraft designer and builder, General Electric's Astro-Space Division (East Windsor, NJ, and Valley Forge, PA). At KSC, UARS will arrive at the barge canal turn basin adjacent to the Vehicle Assembly Building; the spacecraft will be offloaded and taken to the Payload Hazardous Servicing Facility (PHSF) located in the KSC Industrial Area where it will undergo final preparation and testing. On or about July 24, UARS will be transferred to the Vertical Processing Facility (VPF) for the start of the integrated tests to verify its compatibility with the Orbiter. On approximately August 13, the spacecraft will be transported to Launch Complex 39A for installation into Discovery where a final battery of tests will be undertaken to verify connections with the Orbiter and the spacecraft's readiness for launch this fall. UARS is the first of a long-term,

national program of space research into global atmospheric change and a leading element of the space agency's Mission to Planet Earth. The spacecraft will provide the comprehensive database needed to understand changes in the upper atmosphere and "for policy decisions to address the human role in such changes." The Upper Atmosphere Research Satellite is managed by Goddard Space Flight Center (Greenbelt, MD) for NASA's Office of Space Science and Applications. [NASA NEWS RELEASE NO. 91-88, May 10, 1991.]



COLUMBIA LAUNCH DATE OFFICIAL: MAY 22

At the end of the first day of the STS 40 Flight Readiness Review, NASA managers have made it official; Columbia will launch May 22 during a window extending from 8 a.m. until 10 a.m. "We're not working any problems that would prevent us from going on that day. Everything looks good," said KSC spokesman Karl Kristofferson. Landing is expected to occur nine days later on May 31 at Edwards Air Force Base, CA. If the launch does proceed as scheduled, it will set a NASA record - the third shuttle flight in 47 days. The previous record was three in 54 days in October-November 1985. The countdown for the mission will begin May 18, a few hours earlier than usual because workers at Launch Complex 39B need more time to load the Spacelab module into Columbia's cargo bay along with equipment and supplies. Also included in the manifest are 30 rats and 2,400 tiny jellyfish. The STS 40 crew is expected to arrive May 19 at about 1:30 p.m. The seven-member crew includes Commander Bryan O'Connor, Pilot Sidney Gutierrez, Mission Specialists Rhea Seddon, James Bagian and Tamara Jernigan; Payload Specialists are Drew Gaffney and Millie Hughes-Fulford. [Banke, FLORIDA TODAY, p. 1A, May 14, 1991, "Next Shuttle Launch Could Set A Record," USA TODAY, p. 3A, May 14, 1991, STS-40 LAUNCH ADVISORY, May 13, 1991.]



STS 40 PROCESSING PROGRESS

Work in progress in preparation for next week's launch of Columbia's STS 40 mission includes: closeouts of the aft main engine compartment; delivery and offloading of liquid oxygen and liquid hydrogen into launch pad storage farms and the Flight Readiness Review underway at Kennedy Space Center. Work scheduled for completion includes Launch Control Center preparations to begin the countdown May 18; Extravehicular Mobility Unit checkout; and aft main engine closeouts. All ordnance devices have been installed and checks have been made of firing circuits; hypergolic propellants have been loaded into the Shuttle's Orbital Maneuvering System and Reaction Control System storage tanks. [KSC SHUTTLE STATUS REPORT, May 13, 1991.]



ATLANTIS STS 43 PREPARATIONS

In KSC's Orbiter Processing Facility's High Bay 2, leak and functional checks have begun on the auxiliary power units; pre-launch testing has also begun on the TDRS spacecraft payload in the Vertical Processing Facility. The removal of the forward reaction control system has been scheduled as have lube oil service for the auxiliary power units and functional tests of the orbital maneuvering system

Pods. Completed processing work includes the removal and replacement of a suspected leaky thruster on the right orbital maneuvering system pod. [KSC SHUTTLE STATUS REPORT, May 13, 1991.]



DISCOVERY POST-FLIGHT OPERATIONS

Currently being removed from Discovery's cargo bay are the primary STS 39 payloads. Completed work includes the removal of STS 39 brakes and tires; these were shipped back to their respective vendors for analysis. Sleep stations and waste containment systems have also been removed. Remaining to be completed: removal of main engine heat shields. The STS 48 payload - the Upper Atmosphere Research Facility - has arrived at the space center. Meanwhile, the newly arrived Space Shuttle Endeavour has been jacked off the floor and leveled. Preparations are underway for removal of the ferry flight tail cone. [KSC SHUTTLE STATUS REPORT, May 13, 1991.]



PROSPECTOR LAUNCH RESCHEDULED: JUNE 5

The launch of a 50-foot Prospector rocket has been rescheduled for June 5 from Cape Canaveral Air Force Station. A first attempt failed on May 6 when an electrical problem prevented ignition of the rocket's solid rocket motor, said **Scott Webster**, President of Orbital Science Corp.'s Space Data Division (Chandler, AZ), manufacturer of the booster. Discovery's launch on May 22 and a Delta 2 launch scheduled for May 29 have delayed the second attempt to launch Prospector. The commercial rocket will carry ten experiments for the University of Alabama's (Huntsville, AL) Consortium for Materials Development in Space, one of 16 NASA Centers for Commercial Development of Space. ["Prospector Launch Rescheduled," FLORIDA TODAY, p. 2A, May 14, 1991.]



NASA SYSTEMS ANALYSIS OFFICE CREATED

NASA Administrator **Richard H. Truly** today announced the establishment of a new Systems Analysis and Concepts Office at NASA Headquarters and designated **James D. Bain** as its Director. The creation of the office is another step in NASA's implementation of the recommendations made in December 1990 by the Advisory Committee on the Future of the U. S. Space Program, which is also known as the "Augustine Committee." In a separate recommendation, the Augustine Committee proposed the establishment of an independent cost analysis function to serve the Administrator and his immediate office. In response to that recommendation, Truly has decided to significantly augment the independent cost capability recently initiated by the NASA Comptroller. This group will report administratively to the Comptroller and provide independent assessments to the Administrator and his immediate office, to include the new Systems Analysis and Concepts Office. Bain previously served as Executive Secretary to the Augustine Committee and is currently staffing the implementation of the Committee's recommendations within NASA. [NASA NEWS RELEASE NO. 91-74, May 13, 1991.]

May 14:

RUNWAY NOT DANGEROUS: O'CONNOR

Astronaut Bryan O'Connor, who is commanding Columbia's upcoming STS 40 mission, says the runway at Kennedy Space Center is not dangerous despite its rough surface which contributes to tire wear. "I'm satisfied that the runway at Kennedy is safe," said the astronaut who served as chairman of NASA's Space Flight Safety Panel from September 1986 through February 1989. He said the investigation which followed Discovery's recent rough landing at KSC showed that tire wear occurred after Discovery had braked to between 34 and 46 mph; the Orbiter had touched down at 242 mph. "That runway is rough," O'Connor said, "and it does wear the outside tread of tires. But if what we're talking about is losing the outside tread of the tire at 34 mph,...I don't consider that to be a safety problem." [Halvorson, FLORIDA TODAY, p. 2A, May 15, 1991.]

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COLUMBIA LAUNCH PREPARATIONS

Launch countdown preparations continue for Columbia's STS 40 mission. Purges of the external tank are underway as are closeouts of the aft compartment and the solid rocket boosters. Final ordnance installation is scheduled for May 16 and the aft compartment will be closed for flight May 17. The countdown starts May 18 at 5 p.m. The STS 40 crew arrives May 19 at 1:30 p.m. and launch is set for 8 a.m. May 22. There were no significant issues of concern in yesterday's Flight Readiness Review. Installation and testing has been completed on the two spacesuits placed onboard the Orbiter for contingency purposes. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

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STS 43 PROCESSING: ATLANTIS

Removal of Atlantis' forward reaction control system is underway. Other work in progress for the STS 43 mission includes: auxiliary power unit (APU) leak and functional tests; power reactant storage and distribution system testing; checks of the main propulsion system helium system; thermal protection system operations; and functional tests of the waste containment system. A leaking thruster on the right orbital maneuvering system pod has been replaced. Still to be completed are the lubrication of the auxiliary power units and functional tests of the orbital maneuvering system pods. The STS 43 solid rocket boosters have also been in processing: technicians are mating the left forward motor segment to the stack and are performing joint closeouts. Still to be completed on the SRBs: stacking the left forward assembly/nose cone to the booster and stacking the right aft segment to the launch platform on May 16. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

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DISCOVERY PAYLOADS REMOVED

STS 39 payloads have been removed from the Space Shuttle Discovery. Technicians have begun removal of the Orbiter's heat shields, checks of the orbital maneuvering system and reaction control system motor valves, preparations to deservice lube oil from the auxiliary power units, main propulsion

system leak and functional tests, post-flight inspections and thermal protection system operations. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

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STS 49 PROCESSING: ENDEAVOUR

The newest Space Shuttle - Endeavour - is undergoing preparations to remove its tail cone by the end of this week and the installation of access to the forward, mid and aft sections of the Orbiter. Also in progress is the removal of ferry flight fixtures. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

May 15:

JOUST 1 UPDATE

The launch of Prospector, a commercial suborbital rocket carrying 10 materials and biotechnology experiments, is set for June 5 from Launch Complex 20 at the Cape Canaveral Air Force Station, FL. The launch is set for 7 a.m. (EDT) and will have a three-hour launch window. The mission entitled Joust 1 is sponsored by the University of Alabama in Huntsville's Consortium for Materials Development in Space (UAH CMDS), Orbital Sciences Corp., Space Data Division, under a contract with the UAH CMDS, will provide the rocket and launch services. Orbital Sciences engineers have determined that an apparent malfunction in the safe and arm device was the cause of a hangfire of the Prospector rocket on May 6 from Launch Complex 20 at Cape Canaveral Air Force Station. The safe and arm device, located below the rocket's service module, is responsible for preventing an accidental ignition of the rocket. When in an armed position, the device allows a firing pulse to pass and ignite the rocket. A new flight-ready safe and arm device will be installed before the June 5 launch attempt is made. The Prospector will provide about 13 minutes of microgravity time for the experiments. The UAH CMDS is one of NASA's 16 Centers for the Commercial Development of Space. UAH CMDS Associate Director Francis Wessling said the payload has been removed from the rocket and work to refurbish the experiments is underway. Most of the work is replenishing chemicals and replacing biological samples used in the experiments. He also said the work could include recharging batteries used to power the experiments. "We're ready to fly," said Wessling. "The principal investigators will be returning shortly to Florida to complete their work and will have no problem in meeting the June 5 launch date." ["Joust 1 Program Update," NASA/KSC PRESS RELEASE, May 15, 1991.]

May 16:

39B CLOSED FOR ORDNANCE INSTALLATION

Launch Complex 39B will be closed today while technicians install explosive devices and pressurize the Orbiter's onboard power system. Kennedy Space Center spokeswoman Lisa Malone, speaking of launch preparations, said, "Everything's going right on schedule. We're pressing forward to start the countdown clock at 5 p.m. The team is looking forward to Columbia's launch next week." She said technicians would remove covers from the Orbiter's 44 steering thrusters tomorrow and take down work platforms from around the Shuttle's three main engines. Today technicians finished pressurizing onboard storage tanks containing toxic chemicals used to power Columbia's orbital maneuvering systems

and continued readying the Orbiter's rear engine section for launch; workers are installing insulation and removing access platforms. [Brown, FLORIDA TODAY, p. 2A, May 16, 1991, Banke, FLORIDA TODAY, p. 5A, May 17, 1991.]

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NOW CONSTRUCTION CONTRACT

NOW Construction, Inc. (Titusville, FL) has been awarded a \$380,800 contract for the construction of an addition to the Occupational Health Facility (OHF) at Kennedy Space Center. The small business firm will have 180 days to complete the 5,000-square-foot, concrete reinforced addition, which will be used for office space. The contract also calls for the installation of modular office furniture. [NASA KSC NEWS RELEASE NO. 60-91, May 16, 1991.]

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HAMILTON ROOFING, INC. CONTRACT

Hamilton Roofing, Inc. (Palm Bay, FL) has been awarded a \$215,121 contract for the third and final phase of roofing work on the Headquarters Building at Kennedy Space Center. Under the fixed price contract, the small business firm has 120 days to replace the built-up roof system on the fourth floor and adjacent third floor areas of the Headquarters Building. The company had also been awarded an earlier contract for roofing work on the east and west wings of the building. Built in the early 1960's the Headquarters Building is one of several major structures of that era scheduled for renovation. [NASA KSC NEWS RELEASE NO. 59-61, May 16, 1991.]

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COLUMBIA STS 40 STATUS

Final ordnance installation has been completed for Columbia's STS 40 mission which is due to begin at 8:00 a.m. May 22. Work already underway includes pressurizing the Orbiter's hypergolic propellant tanks and closeouts of the aft compartment and solid rocket boosters. Launch Complex 39B will be reopened for final launch preparations this afternoon. Work remaining to be done includes installing the doors on the aft compartment - set for May 17; The start of the launch countdown is scheduled to begin at 5 p.m. May 18 and the STS 40 crew is expected to arrive at Kennedy Space Center about 1:30 p.m. May 19. [KSC SHUTTLE STATUS REPORT, May 16, 1991.]

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STS 43 ATLANTIS WORK PROGRESS

Leak and functional tests of the auxiliary power units have been completed on Atlantis and the Orbiter's brakes have been installed. The external tank umbilical door hinge housings must yet be installed; APU lube oil service will be made this week. On May 18, Atlantis' three main engines will be installed and functional tests of the Orbiters OMS pods will be made next week. Work in progress includes leak and functional tests of the water spray boilers; hot lube oil flush of the auxiliary power units; power reactant storage and distribution system testing; checks of the main propulsion system helium system; thermal protection system operations; functional tests of the waste containment system; installation of the

landing gear flight wheels and tests of the Orbiter's flight control system. [KSC SHUTTLE STATUS REPORT, May 16, 1991.]

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DISCOVERY STS 48 PROCESSING

The Space Shuttle Discovery continues to undergo processing in the Orbiter Processing Facility High Bay 1. A thruster on the right orbital maneuvering system pod is being replaced currently; it was found to be leaking May 15. Heat shields are being removed; checks are being made of the orbital maneuvering system and reaction control system motor valves; preparations have begun to deservice lube oil from auxiliary power units and to conduct main propulsion system leak and functional tests. Additional post-flight (STS 39) inspections are being carried out as well as thermal protection system operations and main engine drying operations. Also underway are preparations to offload residual hypergolic propellants. [KSC SHUTTLE STATUS REPORT, May 16, 1991.]

May 17:

NEW LAUNCH DIRECTOR AT KSC

James Harrington will be substituting for Robert B. Sieck as Shuttle Launch Director when Columbia begins its STS 40 mission on May 22. Sieck will be away from Kennedy Space Center celebrating the marriage of his daughter Anne and will be missing his first Shuttle launch since the return to flight of Discovery on its STS 26 mission in 1988. Preparations for the launch of Columbia are on track; the crew is expected to arrive at about 1:30 p.m. on May 19. [Banke, FLORIDA TODAY, p. 2A, May 18, 1991.]

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KSC WORKERS TREATED FOR RASHES

A white powdery substance was noticed in Discovery's mid-fuselage area today while technicians were removing thermal blankets from the payload bay. Ten Lockheed Space Operations Co. employees performing this job at Kennedy Space Center's Orbiter Processing Facility complained of itchy, rash-like skin irritations on their arms and faces and some complained of respiratory problems, according to KSC spokeswoman Lisa Malone. They were sent to the Occupational Health Facility where they were treated and released. Discovery's bay has been vacuumed and an environmental engineer is analyzing the substance. Malone later said that preliminary analysis indicated that the substance was either titanium-oxide or titanium-silicate, both of which are non-toxic. She said further that the substance probably came from one of the heat-resistant blankets or a primer coat of paint on the Shuttle. The Orbiter was undergoing post-flight processing following its landing at KSC May 6 at the conclusion of its STS 39 mission. Discovery's next flight is expected to come in September. ["Dust in Discovery," NASA/KSC NEWS RELEASE, no number, May 17, 1991, 1:30 p.m., "KSC Workers Treated for Rashes," FLORIDA TODAY, p. 2A, May 18, 1991.]

May 18:

COUNTDOWN FOR STS 40 CONTINUES

The countdown for Columbia's STS 40 mission continues on schedule for its May

22 launch, according to KSC spokesman George Diller. Columbia's rear engine compartment and two solid rocket boosters are now ready for launch; payload bay doors will be closed today. Propellant loading onboard the Orbiter will also begin today; the liquid oxygen and liquid hydrogen are used to provide electricity and drinking water. "The early weather outlook appears favorable with an 80 percent chance of acceptable weather at the scheduled launch time," said Diller. A temperature of about 72 degrees with winds from the east at 9 to 14 miles per hour are forecast along with two layers of scattered clouds and visibility for seven miles. "The only concern," Diller said, "is a slight chance of an early morning rainshower moving on shore from the Atlantic." [Banke, FLORIDA TODAY, p. 1A, May 19, 1991, Memo to PIOS/Press From George Diller/NASA-KSC, May 17, 1991.]



GEORGE M. LOW AWARD FINALISTS

Two Kennedy Space Center contractors have been chosen as finalists for NASA's top quality and productivity award - the George M. Low Award - NASA announced recently. EG&G Florida, Inc. (Cocoa, FL), Base Operations Contractor, was named a finalist for the 1991 Award for the third consecutive year. Also selected as a finalist was Grumman Technical Services Division (Titusville, FL), a subcontractor on the Shuttle Processing Contract. The award is named for former NASA Acting Administrator George M. Low and recognizes performance among the agency's contractors and subcontractors. The winner will be announced in October. ["KSC Contractors Up for Award," FLORIDA TODAY, p. 10E, May 19, 1991.]



25 YEARS OF SERVICE TO KSC

Union Carbide Industrial Gases Inc.'s Linde Division (Mims, FL) has been providing liquid oxygen and liquid nitrogen to Kennedy Space Center for the past 25 years. KSC Director Forrest S. McCartney recognized their achievement by the plant a KSC Group Achievement Award. He commended their years of safe operation without a lost work day case and noted the Linde plant's drivers' record of traveling more than 6.6 million accident-free miles. The company also provides liquified gases to hundreds of industrial plants in Florida and Georgia. ["Mims Plant Marks 25 Years Serving NASA," FLORIDA TODAY, p. 9E, May 19, 1991.]



GETAWAY SPECIALS RIDE AGAIN

"It feels good to be back on the Shuttle again," said Clarke Prouty, Getaway Special Mission Manager for NASA at Goddard Space Flight Center (Greenbelt, MD). Columbia will be carrying Getaway Special experiment packages for the first time on any Shuttle since the Challenger accident in 1986. The program is designed "to provide anyone with the opportunity to fly a small, self-contained experimental payload on a Shuttle mission and to do so for a very low cost," Prouty said. Columbia will carry twelve such experiments. [Halvorson, FLORIDA TODAY, p. 9E, May 19, 1991.]

May 19:

STS 40 CREW ARRIVES AT KSC

"We're all ready to go. Light 'em," said Mission Specialist **Tammy Jernigan**, flashing a thumbs-8- sign to journalists on hand at the Shuttle Landing Facility today. "We hope you'll have your fingers crossed for clear skies and smooth sailing Wednesday morning," added **Rhea Seddon**, also a Mission Specialist. Columbia's STS 40 crew of seven arrived at Kennedy Space Center today at . The other members of the crew include Commander **Bryan O'Connor**, Pilot **Sid Gutierrez**, Mission Specialist **James Bagian** and Payload Specialists **Drew Gaffney** and **Millie Hughes-Fulford**. At Launch Complex 39B, technicians are preparing to load hazardous fuels aboard the Orbiter. The STS 40 mission will be NASA's third in seven weeks and the 41st since launches began April 12, 1981. The STS 40 mission is also the first in which as many as three women have been members of a single Shuttle crew. [Halvorson, FLORIDA TODAY, p. 1A, May 20, 1991.]

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STS 40 POSTPONED: HARDWARE PROBLEMS

Officials at Kennedy Space Center have decided today to postpone the liftoff of STS 40 until June 1 at the earliest while the launch team replaces and retests the 9 temperature transducers, the multiplexer demultiplexer and general purpose computer number 4. After failure analysis recently conducted by the vendor in New Hampshire, officials decided to replace the nine cryogenic temperature transducers in the main propulsion system. There is a concern they could break off as the propellant is flowing through the main propulsion system and wind up in the main engines. The multiplexer demultiplexer (MDM) is one of 23 and is located in the Orbiter's aft compartment bay 5. MDMs receive and translate data from the Orbiter's general purpose computers to critical systems. This particular MDM FA 2 controls functions for solid rocket boosters, Orbiter hydraulic systems, ordnance devices and the orbital maneuvering system and reaction control system. General purpose computer number 4 is one of 5 and is located in the Orbiter's crew cabin. The temperature transducers, or sensors, are six inches long and shaped like a cigarette; they measure the temperature of liquid oxygen and liquid hydrogen as they flow from the external tank to the three main engines. They are manufactured by RDF Corp. (Hudson, NH). NASA engineers feared that a weld defect could cause a sensor to break free and drop into the fuel lines, potentially causing a shuttle failure. Columbia's processing manager, **Bascom Murrah**, said, "If one did let go, it would be a bad day. It's just too risky...because there is nothing in between the probes and the pumps on the engine. The pump couldn't withstand that kind of problem, so I think we would lose an engine for sure." He said that NASA was notified of the potential problem early this morning as the countdown approached 30 hours before liftoff. RDF Corp. said that tests on a sensor which failed during a Columbia fueling test in September 1990 showed that the unit had a cracked weld. That specific sensor was replaced, but later analysis suggested that all of the sensors might be suspect.

Murrah said he did not know why the analysis "failed to surface until when it did; it shouldn't happen, but it did and we've got to fix that problem." RDF spokesman **Randy Gauthier** said his company had no comment on the analysis or the late

notification of NASA. The space agency said that its early decision to scrub the launch proved its post-Challenger safety system worked. "The mission management team was formed following the Challenger accident to deal with just such problems at a very high level," said NASA Test Director **Mike Leinbach**. Preparations to replace the MDM, temperature transducers and general purpose computer number 4 are underway as workers gain access to the aft compartment. Work has also begun to reconnect the Orbiter midbody umbilical to the Shuttle. This unit was used to deliver reactants to the Orbiter's fuel cell storage tanks and will be used to offload propellants. Ordnance devices will also be disconnected. Columbia's communications systems have been activated; the tail service masts on the launch platform have been prepared for launch; these masts are means through which liquid oxygen and liquid hydrogen propellants are loaded into the external tank. The crew of STS 40 will return to Johnson Space Center (Houston, TX) early tomorrow morning for more training. Mission Commander **Bryan O'Connor** said, "The crew is disappointed we couldn't go on time. We were ready to go up and do this mission. We understand that there are a lot of things that can go wrong on the Shuttle, and we're glad the Cape team is attacking the problems as thoroughly as they are. [KSC SHUTTLE STATUS REPORT, 1 p.m., May 21, 1991, Halvorson, FLORIDA TODAY, pp. 1A-2A, May 22, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, May 23, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-11, May 22, 1991.]



SPACE MIRROR CRACKED

Tiny cracks have been spotted in four stones in the Space Mirror, the newly dedicated Astronauts Memorial; the granite blocks will have to be replaced, according to AMF spokeswoman **Debbie Laing**. "We think it's a problem that can be easily fixed. It's something that came up that nobody could plan for," Laing said. The designers of the \$6.2 million memorial knew about the cracks as early as February, but repairs could not have been completed before the May 9 dedication. NASA's **Ed Harrison** knew about the cracks, too. "We want it to be corrected and they've agreed to correct it, but it doesn't distract from the memorial's attractiveness," Harrison said. Laing said that the monument's designers believe that the clear acrylic that fills each letter of the astronauts' names is expanding because of the heat and that is putting pressure on the surrounding stone. So far, six cracks - each leading from the corner of a letter to the edge of a panel - have been discovered. [Brown, FLORIDA TODAY, p. 1B, May 22, 1991, "New Astronaut Memorial Flawed," USA TODAY, p. 3A, May 22, 1991, Date, THE ORLANDO SENTINEL, p. A-11, May 22, 1991.]

May 22:

STS 40: LAUNCH PREPARATIONS

Kennedy Space Center processing teams are continuing work on a processing schedule which could lead to launch of Columbia on Saturday, June 1. The two-hour launch window opens at 8 a.m. EDT. Preparations are underway to replace the nine propellant temperature transducers, the multiplexer demultiplexer (MDM) and the number 4 general purpose computer. Workers are scheduled to disconnect ordnance devices from 8 p.m. to midnight tonight. The pad will be

closed to all non-essential personnel during this operation. Replacement of all components is scheduled to begin at midnight tonight after the pad has been reopened and will continue through tomorrow. Retest of the transducers and the GPC is scheduled to be completed by tomorrow (May 23) afternoon. Retest of the MDM requires more time and is scheduled to continue through Saturday (May 25). Launch countdown preparations will also begin Saturday; ordnance devices will be reconnected and closed out for flight next week. The countdown is scheduled to begin May 28 at 5 p.m. with the countdown clock at the T-43 hour mark. [KSC SHUTTLE STATUS REPORT, 4 p.m., May 22, 1991.]

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SENSOR CRACKS ON STS 37 & 39

Dan Germany, Johnson Space Center Shuttle Office Head, said that if he had known about sensor cracks in time he would have halted the countdowns for both STS 39 and STS 37. The metallurgy report which indicated the cracks was not available before those launches, even though the analysis was complete by then. RDF Corp. (Hudson, NH) which manufactured the temperature transducers (sensors) which were found to have cracks on Columbia had completed its analysis of the sensors as early as April 1. The company did not notify NASA about the cracked weld until early on May 21, just 32 hours before Columbia was to launch. In the meantime both Discovery and Atlantis had been launched. Concern about the sensors began in September 1990 when the space agency was concerned about hydrogen leaks on Columbia and Atlantis. Engineers noted that one of Columbia's fuel-line sensors leaked slightly, so the sensors were sent to the Orbiters manufacturer Rockwell International. Then Rockwell sent the sensors to the wrong subcontractor - Eaton Corp. (CA) - where it stayed for four months. "Somebody thought they knew where [the sensor] goes to and just didn't take the time to look it up," according to Shuttle Orbiter Division Director (JSC), Keith Hudkins. The actual sensor manufacturer - RDF Corp. - did not get the sensors until January 1991.

Germany said the error occurred because the sensor evidenced only a small leak and not a crack; that resulted in a low priority being assigned. He said that now all problems with a "criticality 1" rating would be assigned high priority and be tracked much more closely. Criticality 1 hardware is any part whose failure could destroy an Orbiter. When RDF finished its analysis on April 1, it consulted with Rockwell and agreed to send the suspect part to a metallurgy lab for more study, according to Germany. That report was completed May 20 and reported to Rockwell within hours; Rockwell reported to NASA right away and the countdown was halted. Germany said, "We dodged a bullet on that. The weld was cracked all the way around...It was just a matter of time before that tip had broken off." He said cracks found on Discovery's sensors were not as severe as those on Columbia's transducers and were not judged as likely to sever. Space Shuttle engineers are giving thought to removing entirely some sensors located immediately above the Orbiter's main engines. "If, technically, we can get by without the sensors, we'll go do that," Germany said. Other sensors in the system are not deemed much of a problem because of their location. Meanwhile, workers have removed insulation which surrounds the sensors in preparation for removing

all nine and replacing them with either spares or plugs. [Date, THE ORLANDO SENTINEL, pp. A-1 & A-19, May 23, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, May 23, 1991, Brown, USA TODAY, p. 1A, May 23, 1991, "NASA Says Error In Shipping Part Delayed A Liftoff," THE NEW YORK TIMES, p. A8, May 23, 1991.]

May 23:

SPCC GROUNDBREAKING

NASA's Kennedy Space Center will host a groundbreaking ceremony for a Space Shuttle Processing Center (PCC) at 1 p.m., (Tuesday) May 28. The PCC will be a three-story, 99,000-square-foot facility dedicated to Space Shuttle Orbiter testing, launch team training and Launch Processing System (LPS) maintenance. The building will provide Space Shuttle engineers and technicians with state-of-the-art areas to improve and maintain their skills during pre- and post-flight processing flows. Each of the PCC's three floors is designed to serve a specific purpose. The facility's first floor will consist of offices, workshops and laboratories for the maintenance and testing of LPS and related equipment. The second floor will contain additional office space as well as areas for launch team training and computer software production. Orbiter control rooms will dominate the PCC's third floor. Three control rooms are planned for use in supporting ongoing Space Shuttle processing inside the three Orbiter Processing Facility high bays. The ceremony's featured speakers will include Kennedy Space Center Director **Forrest S. McCartney**, KSC Director of STS Management and Operations **Jay Honeycutt** and KSC's Director of Engineering and Development **Walter Murphy**. The PCC will be located between the Orbiter Processing Facility and Operations Support Building in the Launch Complex 39 area. The \$8.9 million facility was designed and will be built by The Haskell Co. (Jacksonville, FL). Construction is set to begin on May 29, and the building is scheduled to be operational by June 1, 1992. ["Groundbreaking for Shuttle Processing Control Center to be May 29," May 23, 1991.]

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PAYLOAD CANISTER FACILITY GROUNDBREAKING PLANNED

A groundbreaking ceremony for KSC's Canister Cleaning and Rotation Facility (CCRF) will be held at 10 a.m. (Friday) May 24. The multi-purpose CCRF will be used for cleaning and maintaining the two environmentally controlled canisters which are used for housing Space Shuttle payloads during moves from their processing facilities to the launch pad or Space Shuttle Orbiter. The CCRF will also be used to rotate the 65-foot-long payload canister from a horizontal to vertical configuration or vice-versa, depending on payload requirements. Payload canisters currently must be transported from their processing areas to the Vehicle Assembly Building to be rotated as requirements necessitate. The CCRF will be built in the immediate area of existing payload processing facilities, resulting in more cost-effective and streamlined operations. "The Canister Cleaning and Rotation Facility will be a tremendous asset to the whole program," remarked KSC's Director of Payload Management and Operations **John Conway**. "It will make the processing of payloads a safer and more efficient operation." Featured speakers for the groundbreaking ceremony include KSC Director **Forrest S. McCartney**, KSC Director of Engineering Development **Walter Murphy**, KSC

Director of Payload Projects Management **JoAnn Morgan** and Conway. The CCRF will consist of an approximate 7,000-square-foot high bay outfitted with a 100-ton overhead bridge crane for rotating the payload canister and the facility will be located in the KSC Industrial Area. The \$5.3 million CCRF was designed by and will be built by Ivey's Construction, Inc. (Merritt Island, FL). Construction is set to begin May 24, and the building is scheduled to be operational by mid-summer 1992. ["Groundbreaking for KSC Payload Canister Facility Set for May 24," May 23, 1991, "Payload Canisters to Get New Home," FLORIDA TODAY, p. 10E, May 26, 1991.]

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COLUMBIA'S SENSORS REMOVED

All nine fuel-line sensors have been removed from the Space Shuttle Columbia. Managers have decided to leave out three of four temperature sensors in Columbia's liquid hydrogen lines and plug the holes for the June 1 launch. **Henry Pohl**, Director of Engineering at Johnson Space Center (Houston, TX) said, "If we can take them out, we ought to take them out. But you have to look at all the avenues to make sure you don't fix one thing and complicate something else." The fourth sensor is in a position where it could be caught by a safety net installed for that purpose. Simultaneously, other Kennedy Space Center workers replaced a computer and a computer interface unit. KSC spokeswoman **Lisa Malone** said that sensors from both Atlantis and Endeavour will also be removed and inspected. NASA Administrator **Richard H. Truly** is unhappy that it took so long for Launch Managers to learn of the sensor analysis; they received a metallurgy report just 32 hours before launch was to have taken place. "From a safety point of view on upcoming flights, we're not concerned at all. From a procedural point of view, we're damn concerned how this one faked us out," Truly said. [Date, THE ORLANDO SENTINEL, p. A-3, May 24, 1991, Brown, FLORIDA TODAY, p. 10A, May 24, 1991, "Shuttle Problems," USA TODAY, p. 3A, May 24, 1991, "NASA Debates Removing Sensors on Space Shuttle," THE NEW YORK TIMES, p. A16, May 24, 1991.]

May 24:

STS 40 COUNTDOWN TO START

The countdown clock for the 11th flight of the Orbiter Columbia, and the 41st Space Shuttle launch, is set to begin at 9 p.m. EDT, May 28, at the T-43 hour mark. This countdown is longer than most and includes 40 hours of built-in hold time leading up to the opening of the launch window at 8 a.m. EDT on June 1. The launch window extends to 10 a.m. EDT. Extra time built into this countdown is to allow for the installation of several time critical experiments including the 20 rodents which will ride in the Spacelab module and 10 in the Orbiter's middeck. The last two built-in holds will be 10 minutes in duration and will occur at the T-20 minute mark, or at 7:20 a.m., and at the T-9 minute mark, or at 7:41 a.m. During the final hold, the flight crew and ground team receive the NASA Launch Director's and the Mission Management Team's final "go" for launch. ["STS-40 Launch Countdown Will Restart May 28," NASA/KSC NEWS RELEASE NO. 68-91, May 24, 1991.]



NASA REVIEW OF SENSOR PROBLEM

Following a meeting today with senior management of NASA's space flight and safety programs, Administrator Richard H. Truly said the agency will conduct a prompt and thorough review concerning the recent discovery that a fuel sensor removed from Space Shuttle Columbia last fall was cracked. He emphasized, however, that he is confident Columbia is fully capable and safe for the upcoming launch of STS 40/Space Life Sciences-1. "We have appointed an expert panel to review how the sensor problem was handled from start to finish," Truly said. "Equally important, we want to determine where any deficiencies exist in NASA's system for handling such issues. I guarantee that any and all necessary changes will be made. NASA will continue to place the greatest emphasis on mission safety and reliability." Truly said he expected preliminary findings to be announced by NASA management at a briefing May 30. The NASA Administrator said the sensor problem has been corrected on Columbia and poses no risk to the Shuttle and its crew of seven, which will undertake a 9-day life sciences mission involving many important, first-time experiments. Launch, which was originally scheduled for May 22, is now tentatively scheduled for June 1. In addition to Truly, today's meeting included William B. Lenoir, Associate Administrator for Space Flight; Robert L. Crippen, Director, Space Shuttle; and George A. Rodney, Associate Administrator for Safety and Mission Quality. ["NASA to Review Sensor Problem, Truly Says Columbia 'Ready to Fly'," NASA/KSC NEWS RELEASE NO. 91-79, May 24, 1991.]



STS 43 PROCESSING PROGRESS

Work in progress upon Atlantis for its STS 43 mission includes a gimbal test of the orbital maneuvering system engines; thermal protection system operations; potable water servicing; water spray boiler leak and functional tests; main engine and main propulsion system tests; functional tests of the orbital maneuvering system; tests of the forward reaction control system at the Hypergolic Maintenance Facility; and auxiliary power unit lube oil servicing. Tests of the ultra high frequency communications system have been completed. Work scheduled for next week includes a functional test of the external tank door; installation of the forward reaction control system; tests of the nose wheel steering system and anti-skid brake tests are planned. [KSC SHUTTLE STATUS REPORT, May 24, 1991.]



DISCOVERY PROCESSING: STS 48

Main engine flight readiness tests and flow checks of the main propulsion system helium regulators have been completed on the Space Shuttle Discovery. Work continuing includes window polishing; preparations to remove the three Shuttle main engines; thermal protection system operations; and inspections of the Orbiter's hydraulic system. Shuttle main engines must be removed next week. [KSC SHUTTLE STATUS REPORT, May 24, 1991.]

May 25:

COLUMBIA'S SENSORS REPLACED

"Everything's still on schedule [for the launch June 1 of Columbia]," according to Kennedy Space Center spokesman **Bruce Buckingham** today. Faulty equipment has been removed from the Orbiter; replacements have been installed and tested. The countdown for STS 40 begins May 28 at 9 p.m. The countdown is expected to be four hours shorter for this second attempt, because some work does not need to be repeated, according to KSC spokeswoman **Lisa Malone**. NASA's Shuttle Program Managers decided to plug suspect sensors rather than replace them. One plug did not work properly and was scheduled for retesting and possible replacement. That work is not expected to delay the launch of Columbia on June 1 between 8 and 10 a.m., EDT. Five liquid oxygen sensors were replaced on Columbia, though there has been no evidence of damage on any of these sensors. Four hydrogen sensors on Discovery are thought to be suspect. NASA engineers are convinced that there is a sufficient record of flight experience to allow future Shuttle missions to fly without the potentially dangerous sensors. Kennedy Space Center will be largely shut down in observance of Memorial Day (May 27), but work will resume May 28 with the countdown starting in the evening. Sunday (May 27) technicians installed explosive devices on the Orbiter and tested a replacement component. [Brown, FLORIDA TODAY, p. 1A, May 26, 1991, Brown, FLORIDA TODAY, p. 1A, May 27, 1991.]

May 28:

COLUMBIA COUNTDOWN STARTS TODAY

Preparations are underway to begin the countdown tonight at the T-43 hour mark for Columbia's STS 40 mission. Work continues on closing out the Orbiter's aft compartment, removing protective covers from components in the aft compartment, final inspections of the compartment and closeouts of the solid rocket boosters. Finished processing work includes a retest of the multiplexer demultiplexer (MDM), replacement of six cryogenic propellant temperature transducers and three plugs in the liquid hydrogen 12-inch feedlines. Successful leak tests of the temperature transducers and the plugs have been completed as have a retest of the newly installed general purpose computer and a reconnection and retest of the Orbiter's ordnance devices. The crew of STS 40 is scheduled to arrive once more at Kennedy Space Center May 29 at 3 p.m. Launch remains scheduled for 8 a.m. EDT June 1 when there is a probability of acceptable weather. The following day, Saturday, there is a 80 percent probability of favorable launch weather. For the overall window on June 1 (from 8 a.m. until 10 a.m.) there is a 95 percent chance of being within weather commit criteria. Work completed in the processing of Atlantis for its STS 43 mission includes servicing the potable water system and auxiliary power unit lube oil. Remaining to be completed are tests of the external tank door; nose wheel steering and brake anti-skid tests. On Discovery - in preparation for its STS 48 flight - work on the midbody continues as do preparations to remove the three Shuttle main engines and checks of the forward reaction control system. On Endeavour purges of the freon coolant loop are progressing as is installation of platforms in the midbody and aft compartment. [KSC SHUTTLE STATUS REPORT, May 28, 1991.]

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PLAYALINDA BEACH CLOSES

Playalinda Beach will reopen to visitors during daylight hours the day following the launch of the Space Shuttle Columbia on its STS 40 mission and will remain open until further notice. Other Canaveral National Seashore beaches such as Apollo Beach are not affected by Space Shuttle launch operations. ["Playalinda Beach to Reopen After STS-40 Launch," NASA/KSC NEWS RELEASE NO. 63-91, May 28, 1991, Bumpus-Hooper, THE ORLANDO SENTINEL, pp. B-1 & B-4, May 26, 1991.]

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COLUMBIA READY TO FLY

"We're looking great for Saturday [June 1]. I know of no technical problems that we're working at all," said Kennedy Space Center Director **Forrest S. McCartney** said today. Echoing the remarks was KSC spokeswoman **Lisa Malone**, who said, "All the work is done, and we're ready to go." Countdown clocks began at 9 p.m. at the T-43 hour mark, pointing toward an 8 a.m. launch Saturday. All of the Orbiter's sensors have been replaced; technicians have also replaced a faulty general purpose computer and a multiplexer demultiplexer. The crew for STS 40 returns to KSC about 3 p.m. tomorrow. The only reason for a delay until Sunday (June 2) would be if there is a delay until May 30 in today's launch of a Delta 2 rocket from Cape Canaveral Air Force Station. NASA and the Air Force, which operates the Eastern Test Range at Cape Canaveral Air Force Station, have agreed to give McDonnell-Douglas Space Systems Co. a second launch attempt this week if bad weather or a minor technical problem halts today's Delta launch. In that event, Air Force workers would need about two days to prepare range safety equipment for a Shuttle launch attempt. [Banke, FLORIDA TODAY, p. 1A, May 29, 1991, "New Parts for Shuttle Pass Final Test Before Countdown," THE NEW YORK TIMES, p. A10, May 29, 1991, "Shuttle on Target," USA TODAY, p. 3A, May 30, 1991, "Columbia Parts OK as Countdown Starts," THE ORLANDO SENTINEL, May 29, 1991.]

May 29:

STS 43 PREPARATIONS

A number of processing activities are currently underway for Atlantis' STS 43 mission: installation of the forward reaction control system; thermal protection system operations; main engine and main propulsion system tests; functional tests of the orbital maneuvering system pods; replacement of the low pressure oxidizer turbo pump on Shuttle main engine number 1; and positioning of the aerosurfaces. Closeouts of the STS 43 solid rocket boosters have begun and cables are being routed for the boosters. Discovery is undergoing removal of Shuttle main engines 1 and 2; functional tests of the forward reaction control system; thermal protection system operations; and deconfiguration of the payload bay. Shuttle main engine number 3 has already been removed and the Orbiter's power system has been validated. [KSC SHUTTLE STATUS REPORT, May 29, 1991.]



ATS: SUBCONTRACTOR OF YEAR

Atlantic Technical Services (ATS) has been awarded Subcontractor of the Year in the Southeast by the U.S. Small Business Administration. At Kennedy Space Center, ATS provides mail distribution services to more than 260 buildings over a 42-mile route. Roger Gribble, Acting Regional Administrator for the SBA, said, "This is a top-flight operation when you see what goes on in day-to-day operations." Jim Dubay, EG&G Florida President and the person who nominated ATS for the award said, "A reliable mail system is critical to the information needs of the many organizations at the Kennedy Space Center. And ATS has a staff that gets the job done." Founded in 1971 by Eschol Walker, the 47-employee company is directed at KSC by Al Nelson, Project Manager and Postmaster of the space center's post office. [Byrd, FLORIDA TODAY, p. 12C, May 30, 1991.]



DELTA LAUNCHES ALASKAN SATELLITE

"We see the vehicle going right down the middle of the path. That's the way we like to see them fly," said Ray Adams, launch commentator for today's successful launch of a McDonnell Douglas Delta 2 rocket at 6:55 p.m. The launch was delayed 31 minutes for the replacement of a broken launch-pad camera which was needed to watch for liquid oxygen leaks while the rocket's first stage was being filled with the propellant. "The communications era has really opened the state for our people. It's more than just a convenience; it's a lifeline service," said Tom Jensen, spokesman for Alascom Inc., Alaska's long-distance telephone provider. "In the next 60 to 90 days, all of Alaska will be using that [Aurora II] satellite to communicate," he said. When upper-level winds changed directions, Air Force officials required 300 VIP spectators to move to another viewing site to avoid possible falling debris if the rocket exploded or had to be destroyed. The next Delta mission is scheduled for June 26, an Air Force navigation satellite. [Banke, FLORIDA TODAY, p. 4A, May 30, 1991, Date, THE ORLANDO SENTINEL, May 29, 1991, Date, THE ORLANDO SENTINEL, p. A-3, May 30, 1991.]



STS 40 CREW ARRIVES, AGAIN

The STS 40 crew returned to Kennedy Space Center today at 3 p.m. Columbia's Commander Bryan O'Connor said, "We hope this time we can get up there and do some science for our country and space program. The crew is ready." NASA Test Director Mike Leinbach said, "If the hardware stays good to us, we'll be ready to go Saturday [June 1] morning." Columbia's Pilot is Sid Gutierrez; the Mission Specialists are: James Bagian, Tammy Jernigan, and Rhea Seddon; the Payload Specialists are: Drew Gaffney and Millie Hughes-Fulford. The crew's four medical specialists - Bagian, Seddon, Gaffney and Hughes-Fulford - will work in the payload bay's Spacelab module conducting heart, lung, blood and other tests on each other to help scientists better understand how humans adjust to space. [Brown, FLORIDA TODAY, p. 4A, May 30, 1991.]

May 30:

BARGE CANAL BRIDGE STALLS TRAFFIC

"I had 15,000 people backed up from here to Nova Scotia, and let me tell you these people get irritated," said Bridgetender Pat Casey, Brevard County Road and Bridge Division. The bridge malfunctioned at 4:30 and left one side of the draw bridge stuck 5 inches above the road's surface. Hundreds of rush-hour Kennedy Space Center workers were held up for 25 minutes. After Casey had raised the bridge to allow a tugboat and a barge to pass, the bridge locked and the control board lost power, she said. "It could have been a multitude of things that caused it - they're not really sure. But it has been remedied and is working fine now," Casey said. Traffic was directed by the Florida Highway Patrol during the incident. ["M. I. Bridge Stalls Traffic," FLORIDA TODAY, p. 1B, May 31, 1991.]

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EQUIPMENT FAILURES INVESTIGATION CONTINUES

An investigation continues today into potential Space Shuttle equipment failures and reporting procedures as Columbia is being readied for an 8 a.m. launch June 1. Forecasts indicate a 70 percent chance of favorable weather for liftoff on time. Today, technicians at Kennedy Space Center will load 30 rats and 2,478 jellyfish into a Spacelab module in the Orbiter's cargo bay and middeck lockers. The countdown proceeded normally throughout the day; the newly installed temperature sensors and computer parts have been extensively tested. The previous attempt to launch Columbia on May 22 was called off 30 hours before liftoff when managers learned of a report raising safety questions about the Orbiter's fitness for flight; a temperature sensor had been found defective. In addition, there were unrelated computer equipment problems. "We would prefer that our procedures had enlightened us and alarmed us about the potential problem sooner than it did," said William Lenoir, NASA Associate Administrator for Spaceflight. He said NASA engineers had missed the questionable nature of the sensors' design and that the probes should not have been certified for flight. He said also that the space agency should have been notified earlier about the sensor problem. "In retrospect, we didn't recognize the potential severity of the problem as early as we should have," Lenoir said. George A. Rodney, who heads the Office of Safety and Mission Quality for the space agency, said, "The issue of why it (the sensor problem) happened is a very serious issue. Our systems didn't minimize the risk as well as we had hoped they would." Rodney also said that the system would be improved to make sure equipment problems no longer "sneak up and bite us" as they did last week. [Brown, FLORIDA TODAY, p. 9A, May 31, 1991, "Weather Likely 'Go' for Columbia Launch," THE ORLANDO SENTINEL, p. A-1, May 31, 1991.]

JUNE

June 1:

STS 40 SCRUBBED: RESET FOR JUNE 5

The launch of Columbia on its STS 40 mission was scrubbed this morning at about 7:15 a.m. EDT when one of three inertial measurement units (IMUs) was deemed unacceptable for launch. The mission was originally scheduled to be launched May 22. The IMUs are the heart of the Orbiter's navigation system and all three are necessary for launch. The accelerometers in IMU No. 2 were behaving erratically early this morning. IMU No. 2 will be replaced starting later today. The 58 pound unit is located on the Orbiter's flight deck just forward of the control and display panels. Each IMU is about 10 inches high, 11.5 inches wide and 22 inches long. "We're disappointed this happened. We came back here thinking the Orbiter was ready to go," said Commander **Bryan O'Connor**. "I think we all realize that there are millions of parts involved in this vehicle and that it's a miracle when we do launch." Kennedy Space Center Launch Director **Robert B. Sieck** said, "We're going to attack it, fix it and get on with flying this machine. In this business, it takes a lot of patience, and disappointment is something we deal with."

Liquid oxygen and liquid hydrogen propellants are being drained from the external tank today; residual hydrogen will be allowed to boil off until tomorrow morning. Liquid oxygen and liquid hydrogen storage farms at the pad will be replenished on June 2 and June 3. Columbia's fuel cell storage tanks will be topped off with liquid oxygen and liquid hydrogen reactants on June 3. STS 40 Commander **Bryan O'Connor** and Pilot **Sid Gutierrez** will be flown by STA to Edwards Air Force Base, CA, tomorrow. They will practice landing approaches on the primary landing site's runways and return to Kennedy Space Center tomorrow night. The rest of the crew - **Tammy Jernigan**, **Rhea Seddon**, **James Bagian**, **Drew Gaffney** and **Millie Hughes-Fulford** will remain at KSC for the June 5 launch attempt. Payload specialist **Drew Gaffney** will leave the catheter in place in a vein near his heart. The 30 rodents and 2,500 tiny jellyfish will be replaced in the Orbiter middeck and in the Spacelab. These operations will be conducted in parallel with the IMU replacement. Pending the successful completion of planned work, the launch countdown is scheduled to resume at the T-11 hour mark at about 5:40 p.m. EDT June 4. Launch is planned for 8 a.m. EDT June 5. At a pre-flight briefing May 31, Space Shuttle Director **Robert L. Crippen** had declared NASA ready to launch Columbia. Shuttle Launch Director **Robert B. Sieck** said, "We feel good about the hardware. It's behaving well; the repair work is all behind us." [KSC SHUTTLE STATUS REPORT, June 1, 1991, Banke and Halvorson, FLORIDA TODAY, pp. 1A-2A, June 2, 1991, Brown, FLORIDA TODAY, p. 1A, June 4, 1991, Leary, THE NEW YORK TIMES, p. 8, June 1, 1991.]



WILEY NAMED MISSION ASSURANCE DIRECTOR

Warren Wiley has been named Director of Mission Assurance at Kennedy Space Center; the position is a new one at the space center and is located within the Safety, Reliability and Quality Assurance Directorate at KSC. Wiley has been

employed by NASA since 1971 and has served as Chief of the Orbiter Main Propulsion System Section at KSC and later as Chief of the Main Propulsion and Fuel Cell Branch and Chief of the Fluids Systems Division. Immediately prior to assuming his new job, Wiley was Deputy Director of Vehicle Engineering. [Banke and Halvorson, "NASA Veteran Named to New KSC Post," FLORIDA TODAY, p. 9E, June 2, 1991.]

June 2: STS 40 LAUNCH SCRUB TURNAROUND

Operations at Launch Complex 39B continue this morning as workers move ahead with launch scrub turnaround procedures. Work to replace the faulty inertial measurement unit that failed yesterday and prompted the scrub of mission STS 40 has been completed and engineers have begun the IMU retest. By Monday evening, the IMU calibrations should be complete. The launch of the Space Shuttle Columbia and the Spacelab Life Sciences mission STS 40 is currently targeted for 8 a.m. June 5. Ten of thirty rodents were removed from two animal enclosure modules last night at about 5 p.m. The approximately 2500 jellyfish were also removed at that time. Removal of the other 20 rats, located in the research and animal holding facility in the spacelab module in Columbia's payload bay is scheduled to begin at 10 p.m. tonight. Other work at the pad today includes circulating an inert gas into the external tank to keep it dry. Additional liquid oxygen is scheduled to be delivered to the pad today; a delivery of additional liquid hydrogen will arrive at the pad tomorrow. The Orbiter mid-body umbilical unit has been mated to Columbia and the connections leak checked. Fuel cell topping off operations are scheduled for early June 3. [KSC SHUTTLE STATUS REPORT, June 2, 1991.]

June 3: COUNTDOWN RESUMES

"We will have a chance of showers anytime on Wednesday (June 5), but the best chance of thunderstorms will be in the afternoon hours," said Meteorologist **Rodney Smith** of the National Weather Service office (Melbourne, FL). The countdown for STS 40 is set to resume today at 1 a.m. for the space agency's third attempt to launch the Columbia whose No. 2 IMU has been replaced. Launch is set for 8 a.m. June 5. The countdown will begin a day earlier than had been announced to make it easier to coordinate today's modified schedule of pre-launch work, according to KSC spokesman **Bruce Buckingham**. Testing and calibration of the new IMU is set to begin about 8 a.m. today; results will be available June 4. [Banke, FLORIDA TODAY, p. 1A, June 3, 1991.]

June 4: LSO'S SARGENT TO RETIRE

Douglas Sargent, President of Lockheed Space Operations Co., will retire August 1 and be replaced by **Gerald Oppliger**, who has been Vice President and Assistant Program Manager for KSC Shuttle Operations since 1987. Kennedy Space Center Director **Forrest S. McCartney** said of Sargent, "his contributions to the return to flight" since the Challenger accident have been significant. "Oppliger," McCartney continued, "has been [Sargent's] deputy and is no stranger to us. I'm certain he

will pick it up without missing a single beat." Opplinger said he did not plan to change operations at present, describing the promotion as a "fantastic opportunity. We'll just continue the operation as it's been going." [Boylan, FLORIDA TODAY, p. 18C, June 4, 1991.]



1992 SPACELAB LAUNCH ON TRACK

Equipment housing experiments for a future Spacelab flight has completed a major series of tests at Kennedy Space Center, keeping the Shuttle mission on track for a March 1992 launch. The Atmospheric Laboratory for Applications and Science (Atlas 1) will be the first Spacelab mission solely dedicated to studying the Earth's atmosphere and how changes in the sun affects the sky. "The payload is in excellent shape," said Anthony O'Neil, Mission Manager, "I believe the Atlas-1 experiments, Spacelab hardware and software performed exceptionally well during the tests and are ready to support the mission sequence test" which is scheduled to run for five days beginning June 10. It will test the entire payload as it is expected to operate on a typical day in orbit. Five astronauts and two payload specialists, commanded by Charles Bolden, will fly the seven-day mission. ["Spacelab Mission On Track," FLORIDA TODAY, p. 10E, June 2, 1991.]



PROSPECTOR LAUNCH DELAYED BY SHUTTLE

A Prospector rocket carrying 10 experiments will have to wait two days to be launched; the delay is caused by the Wednesday (June 5) launch of Columbia taking precedence. The Prospector launch is now scheduled to occur between 7 a.m. and 10 a.m. June 7. An investigation into the failed launch attempt on May 6 showed that a device designed to prevent accidental ignition of the rocket did not rotate into the proper firing position. "If you're going to have a failure, that's probably the best kind of failure, whereas if you have to destroy a missile, you end up starting all over from scratch." The "safe and arm" device has been replaced. Orbital Sciences Corp. spokeswoman Barbara Zadina said, "Everything should be ready to go. We're confident that we have a good crew out there and that they've done a good job identifying and fixing the problem." [Brown, FLORIDA TODAY, p. 2A, June 4, 1991, Halvorson, FLORIDA TODAY, p. 10E, June 2, 1991.]



COUNTDOWN STATUS

Technicians at Launch Complex 39B are performing a repair on a small portion of the insulation of the External Tank being flown on the STS 40 mission. During a walkdown of the pad this morning, it was noticed that the foam insulation covering a plate had debonded. The insulation area measures four and one-quarter inches on a side and is 1.35 inches in thickness. It is located near the forward attach point for the Orbiter and External Tank. NASA spokesman Ed Champion said, "The concern is that the insulation might come loose during ascent and pieces could fly back and damage the tiles on the Orbiter." The patch was glued back on the tank at 2 p.m. and touched up again about 6 p.m. It is now expected that the Rotating Service Structure at the pad will be rolled back between 6 and 7 p.m. in preparation for the tanking operation to begin shortly

before midnight. Off-line tests of the curing process are underway and data from those tests will be reviewed as part of the decision-making process on whether to proceed with tanking. The tests will provide data on bonding strength at different cure times. A decision on proceeding with the tanking operation will be made late this evening. This morning, Commander **Bryan O'Connor** and Pilot **Sid Gutierrez** practiced approaches to the Shuttle Landing Facility in the T-38 jets. Meteorologists for the Air Force were watching a cool front moving in from Canada which increased the chance of excessive cloudiness, lightning and thunderstorms over Launch Complex 39B. The probability of acceptable weather at 8 a.m. June 5 is 50 percent. For the overall window, there is a 60 percent chance of being within launch weather commit criteria. One of thirty laboratory rats will miss the flight because the water dispenser in its cage was malfunctioning. [STS-40 COUNTDOWN STATUS, 4 p.m., Tuesday, June 5, 1991, KSC SHUTTLE STATUS REPORT, June 4, 1991, Halvorson, FLORIDA TODAY, p. 1A, June 5, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-11, June 5, 1991, "Shuttle Launch," USA TODAY, p. 3A, June 5, 1991, Leary, THE NEW YORK TIMES, p. A12, June 5, 1991.]



STS 43 PROCESSING: ATLANTIS

Work in progress on the Space Shuttle Atlantis includes thermal protection system operations, main engine and main propulsion system tests, functional tests of the orbital maneuvering system pods, hookups of the low pressure fuel turbopump on Shuttle main engine no. 3 and a wing positive pressure test. Functional tests of the galley have been completed. Installation of heat shields around the three main engines and of the getaway special beam in the payload bay remain to be accomplished. [SHUTTLE STATUS REPORT, June 4, 1991.]



DISCOVERY, ENDEAVOUR PROCESSING: STS 48

A number of processing operations are underway for Discovery's STS 48 mission: tests of the fuel cells, leak and functional tests of the water spray boilers, main propulsion system tests, thermal protection system operations, deconfiguration of the payload bay. Scheduled work includes replacement of the nose landing gear axle. Work in progress on the Space Shuttle Endeavour includes main propulsion system leak checks, thermal protection system operations, work in the environmental control life support system and removal of the 2 and 4 inch lines in the liquid hydrogen main propulsion system. [SHUTTLE STATUS REPORT, June 4, 1991.]

June 5:

COLUMBIA: THIRD TIME'S THE CHARM

Space Shuttle Program pioneer Columbia finally made it into space today with a 9:25 a.m. liftoff from Launch Complex 39B. The twice delayed STS 40 carried into orbit seven astronauts - four men, three women - along with 29 rats and 2,478 jelly fish on a nine-day medical research mission. Launch Director **Robert B. Sieck** said, "We're certainly pleased to have Columbia, the crew and all the critters in orbit. Speaking at a news briefing, NASA Administrator **Richard H. Truly** noted

that NASA "has been launching a safe and successful space shuttle flight every month-and-a-half for two years and eight months." That success, he said, proved that the space agency could operate large projects and make use of the Space Shuttle to support the proposed Space Station. The full House of Representatives is to vote on funding for the Space Station June 6. The STS 40 mission was originally scheduled to be launched May 22 when concern about the Orbiter's temperature fuel sensors safety scrubbed the liftoff attempt. When a navigation unit failed June 1, the second effort was scrubbed. This morning's launch was threatened by cloudy weather and concern about a 4-inch-square piece of foam insulation on the extern fuel tank. The patch that was put on the tank was considered ready enough for launch and the clouds eventually moved sufficiently to allow the launch. The countdown was halted at the 9 minute mark just before 8 a.m. and was resumed at 9:15. Columbia is expected to launch June 14 at Edwards Air Force Base, CA. [Halvorson and Banke, FLORIDA TODAY, pp. 1A-2A, June 6, 1991. Other feature stories on the launch of STS 40 may be found on p. 10A of the cited issue; Leary, THE NEW YORK TIMES, p. A8, June 6, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-8, June 6, 1991, Broad, "Space Errors Share Pattern: Skipped Tests," THE NEW YORK TIMES, pp. B-5 & B-8, June 11, 1991.]

June 6:

SPACE STATION REVIVED

The U. S. House of Representatives today voted to provide NASA with \$1.9 billion of the \$2 billion President Bush asked for to fund the Space Station Project. NASA Administrator Richard H. Truly said: The totally bipartisan vote in the House of Representatives to continue development of Space Station Freedom was a big victory for all America. It was a vote to remain the leader in space exploration, to inspire and challenge our young people to do better, to reassert our technological leadership [and] to make an investment in America's future, and set the stage for discovery and breakthroughs in medicine, materials, transportation and energy. I am confident that Freedom will win support in the Senate. Much work remains to be done to provide a final FY 1992 budget for NASA that is well balanced between science, manned space flight and exploration, aeronautical research, earth observation and technology development. I remain committed toward that end. The U. S. Senate takes up NASA's proposed 1992 budget in July. [Crawford, THE ORLANDO SENTINEL, pp. A-1 & A-2, June 7, 1991, Crawford, THE ORLANDO SENTINEL, pp. A-1 & A-6, June 9, 1991, Halvorson, FLORIDA TODAY, p. 1A, June 7, 1991, Halvorson, FLORIDA TODAY, June 8, 1991, NASA/KSC NEWS RELEASE NO. 91-88, June 6, 1991, Lawler, SPACE NEWS, pp. 3 & 28, June 10-16, 1991.]

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PAD DAMAGE SLIGHT

Scorched paint was the only damage noted on Launch Complex 39B, according to KSC spokesman Bruce Buckingham. No damage was reported in the payload changeout room. Pad workers spent today cleaning the pad and began preparations for moving Columbia's mobile launch platform back to the Vehicle Assembly Building no June 13. Discovery's STS 43 mission will be the next flight

to originate from LC 39B. Columbia's solid rocket boosters were recovered June 5 and returned to Cape Canaveral Air Force Station the next day; Buckingham said little damage was observed in initial inspections of the boosters. Buckingham said the boosters would be cleaned, disassembled and prepared for a future launch. He said that mission managers were discussing a leaking helium tank discovered in Atlantis and whether to replace it. The leak is considered small and may not require replacing the tank. [Banke, FLORIDA TODAY, p. 6A, June 7, 1991, KSC SHUTTLE STATUS REPORT, June 6, 1991.]



PROSPECTOR LAUNCH DELAYED, AGAIN

The launch of Prospector, a commercial suborbital rocket, has been tentatively reset for June 8 at 7 a.m. from Launch Complex 20 at the Cape Canaveral Air Force Station. The Joust 1 mission was scrubbed after poor weather prevented the Orbital Sciences Corp., Space Data Division launch team from completing vehicle processing work June 5. Dr. Charles Lundquist, Director of the University of Alabama in Huntsville Consortium for Materials Development in Space (UAH CMDS), said lightning around Launch Complex 20 kept the team away from the launch pad for approximately three hours. Lundquist said the team would resume its work today weather permitting. Because of the weather delay, a simulated countdown scheduled for today will be conducted at 6:30 a.m. June 7. A final decision to pursue a June 8 launch would be made the morning of June 7. Air Force weather forecasters said today that there was a 40 percent chance that weather conditions would be favorable for a launch June 8; weather conditions must also be taken into account for the safe operation of the payload recovery ship which is located in the Atlantic Ocean about 250 miles from the launch site. The Prospector will carry 10 materials and biotechnology experiments approximately 380 miles into space and provide the experiments about 13 minutes of weightlessness before the payload returns to earth for an ocean landing. The Joust 1 mission is sponsored by the UAH CMDS, a NASA Center for the Commercial Development of Space. Orbital Sciences, under a contract with the UAH CMDS, will provide the rocket and launch services. [Banke, FLORIDA TODAY, p. 6A, June 7, 1991, JOUST 1 UPDATE, June 6, 1991.]



STS 43 LAUNCH PREPARATIONS

A number of processing activities are underway on Atlantis in preparation for its STS 43 flight which is scheduled now for a late summer liftoff. Work in progress includes: main engine and propulsion system checks; main engine heat shield installation; thermal protection system tile work; replacement of left OMS engine actuator due to malfunction during gimbaling test; payload integration verification test; Environmental Control and Life Support System servicing; and a landing gear functional test. Completed work includes: a main landing gear strut hydraulic level check; gaseous nitrogen leak check; and installation of the OMS heat shield. Checks and tests remaining to be done are the SSME interface leak checks; payload verification tests and a crew equipment interface test. [KSC SHUTTLE STATUS, June 6, 1991.]

June 7:

POST-LAUNCH CLEANUP

Columbia's solid rocket boosters arrived today at Hangar AF at Cape Canaveral Air Force Station; there was no noticeable damage observed. Post-launch operations were underway at Launch Complex 39B where auxiliary power unit service carts were being removed. The mobile launcher platform was scheduled to be removed to the VAB high bay 3 on June 10. Columbia is scheduled to land at 1:14 p.m. EDT at Edwards Air Force Base, CA. [KSC SHUTTLE STATUS REPORT, June 7, 1991.]

II

DISCOVERY CONTRIBUTION TO COLUMBIA MISSION

Discovery's payload bay and payload bay doors were configured to support an extra-vehicular activity demonstration test. This test is required to support possible a EVA on Columbia to repair the left-hand payload bay door aft bulb seal. The test will involve astronaut Kathy Sullivan performing the EVA demonstration. Lube oil servicing on the auxiliary power units is underway as are water spray boiler leak and functional tests and main propulsion system and OMS pod system checks. Main engine controller checkouts and TACAN system checks have been scheduled in preparation for Discovery's STS 48 mission. [KSC SHUTTLE STATUS REPORT, June 7, 1991, "Test Is Determining Need of Shuttle Repair," THE NEW YORK TIMES, p. 6, June 8, 1991.]

II

ATLANTIS LAUNCH PREPARATIONS

The payload integration and verification test has been completed for the STS 43 mission of Atlantis, now scheduled for July 25. Work in progress included preparations to replace main propulsion system helium tank number 4 following a leak test failure; main engine heat shield installation; main engine and main propulsion system checks; thermal protection system tile work; Environmental Control and Life Support System servicing and a landing gear functional test. Orbiter hydraulic operations are scheduled as are SSME interface leak checks, crew equipment interface tests and main landing gear functional tests. [KSC SHUTTLE STATUS REPORT, June 7, 1991, Banke, FLORIDA TODAY, pp. 10E & 9E, June 9, 1991.]

II

WAVES DELAY PROSPECTOR LAUNCH

The launch of a Prospector sounding rocket has been delayed until June 9 at the earliest because of high waves in the Atlantic Ocean. For recovery of the rocket's experiment payload to be successful, waves must be six feet or less. Air Force forecasters predict that waves are expected to remain high through the weekend. [Banke, FLORIDA TODAY, p. 4A, June 8, 1991.]

II

AMES WINS PUBLIC SERVICE MEDAL

M. H. "Red" Ames, Boeing Space Operations Project Engineer, has been awarded a NASA Public Service Medal for contributions to the U. S. space program.

Kennedy Space Center Deputy Director James A. "Gene" Thomas presented the award to Ames. Dean Helling, General Manager of Boeing's Engineering Support Contract at KSC, said, "We are very proud of Red and his unrelenting efforts toward the successful completion of many NASA/Boeing projects." Ames was cited by NASA for successfully leading an effort to upgrade a device used to test lifting equipment at KSC's Launch Equipment Test Facility. ["Boeing Engineer Wins NASA Award," FLORIDA TODAY, p. 9E, June 9, 1991.]

June 9: PROSPECTOR AIMS FOR JUNE 14 LAUNCH

Prospector was ready to launch this morning when a technical problem could not be solved quickly and the launch was scrubbed. "It was most disappointing because the countdown was proceeding the scrub was so clean," said Scott Webster, President of Orbital Science Corp.'s Space Division (Chandler, AZ). About forty minutes before its scheduled 7 a.m. launch, workers prepared to connect two wires aboard the rocket when it was discovered that one had more electrical energy running through it than launch rules allowed. The cause of the high voltage readings is now attributed to batteries which power the flight termination system. Officials now say that June 14 is the earliest possible date for the next launch attempt, because an ocean recovery ship will not be available until that date. [Banke, FLORIDA TODAY, p. 4A, June 10, 1991, Halvorson, FLORIDA TODAY, p. 4A, June 11, 1991.]

June 10: UCF AIDS SPACE STATION RESEARCH

A potential Space Station crew return vehicle is being designed and tested in Orlando by engineering students at the University of Central Florida (UCF). The Assured Crew Return Vehicle (ACRV) is an escape vehicle that would enable sick or stranded astronauts to return safely to Earth in the event a Space Shuttle rescue mission was unable to reach the crew in a timely manner. NASA has decided that the ACRV will be a critical element of Space Station Freedom prior to it becoming a permanently manned facility. UCF's involvement with the ACRV began in the 1989-90 school year when about 30 senior-level engineering students worked on potential designs for the rescue and recovery subsystems of the crew return vehicle. Using the Apollo capsule as the basis for their concept, the students designed a detailed ACRV which was later constructed on a one-fifth scale by the 1990-91 senior engineering class. Balance and drop tests were conducted in a local swimming pool and a water test facility at Oregon State University to simulate ocean conditions over a period of five days. The project was headed by Dr. Loren Anderson of UCF; he said, "[The ACRV] took a lot of abuse, but it worked like we planned and came out all right from the testing. It was a valuable test for the project and an invaluable experience for the students." KSC's ACRV Manager, Glenn Parker, has worked closely with Anderson and assisted and monitored the college's work on the project. "The work they've done over there at UCF has been absolutely great," remarked Parker. "We've had to give them quite a bit of guidance, but the students are so committed and dedicated that it's been well worth the effort." Anderson said he expects students to continue to work on the ACRV project for at least the next school year. "We

have significantly improved our work on the program," Anderson said, "and certainly inspired interest in aerospace engineering as a result of our involvement. We're happy to be a part of the Space Station." [Varnes, NASA/KSC NEWS RELEASE NO. 69-91, June 10, 1991.]

June 11: SPACE EXPLORATION INITIATIVE STRATEGY

A Federal study group - the 22-member Synthesis Group -headed by former astronaut **Thomas Stafford**, today proposed a strategy for returning humans to the Moon by 2004 and on to Mars by 2014. "By starting the Space Exploration Initiative now, we can enable America to lead humanity on its inevitable path into space and toward the brighter future it will provide for all," said Stafford at a White House news briefing. Vice President **Dan Quayle**, who spoke at the briefing, said the report "sets the path for permanent, manned exploration of space." Quayle called the Synthesis Group report the first "serious look ... at how to fulfill the president's objectives in space." Expressing optimism that public support can be generated for the Space Station project, Quayle went on to say, "We've all just gone through a bruising, tough fight on Space Station Freedom. If the Space Station had not gone forward, in my judgment it would have set space exploration back for at least a generation. We all know there are budget limitations," Quayle continued, "But I can assure you that the political will in the [Bush] administration for these types of endeavors will continue." Stafford said his group did not have the resources or mandate to make cost estimates of the exploration ventures, but studies by NASA and other organizations have put the cost at \$500 billion or more. Stafford said the whole effort could be got underway for "very modest sums," adding, "No one is being asked to sign a blank check for this effort." [Leary, THE NEW YORK TIMES, p. A10, June 12, 1991, "Study: U. S. Should Return to Moon, Shoot for Mars," THE ORLANDO SENTINEL, pp. A-1 & A-4, June 12, 1991, Isbell, SPACE NEWS, p. 6, June 17-23, 1991.]

June 12: SUPPORT OPERATIONS DIRECTOR DIES

James E. Rice, 58, Director of Center Support Operations at Kennedy Space Center died at his home today. KSC Director **Forrest S. McCartney** said of him, "Jim Rice's contributions over his long and distinguished career have been numerous and significant. He is truly one of the pioneers of the Kennedy Space Center and has been a respected colleague of all of us. His loss will be felt by the center and his many friends, but we all feel the better for having had Jim as a companion and team member these many years." James E. Rice is survived by his wife, **Arleen Rice** (Satellite Beach, FL), and a daughter, **Nicole Rice** (Cocoa Beach, FL). Services will be conducted June 18 at Trinity Presbyterian Church (Satellite Beach) with a reception to follow immediately. [Bailey, FLORIDA TODAY, p. 3B, June 15, 1991.]

□ STS 43 PROCESSING: ATLANTIS

Environmental Control and Life Support System servicing has been completed on Atlantis in preparation for its STS 43 mission scheduled for July 25. Orbiter

hydraulic operations, main engine and main propulsion system checks and main engine heat shield installation have also been accomplished. In progress are aft bay closeouts, aerosurface cycling operations, special bulb seal inspections, thermal protection system tile work, structural checks, and preparations for final payload bay cleaning. SSME interface leak checks are scheduled as is final payload bay door closing. The TDRS-E payload will be delivered to the pad June 17. Work is also progressing on the external tank and solid rocket boosters being readied for Discovery's upcoming mission. Electrical mates and checkouts are proceeding; replacement of the lower strut and associated line cable is underway as are strut closeouts and foaming operations. [KSC SHUTTLE STATUS REPORT, June 12, 1991.]

□

STS-48/UARS PROGRESS

Main propulsion system checks, S-Band antenna system checks and deployment of the remote manipulator system to vertical have been completed in the processing of Discovery for STS 48 which will deploy the Upper Atmosphere Research Satellite (UARS) in the early fall. Landing gear functional tests are proceeding as are Orbital Maneuvering System (OMS) functional checks, onboard fuel cell tests and the water spray boiler 48-hour decay checks. Main engine controller checkouts, hydraulic and flight control checkouts and auxiliary power unit leak and functional tests remain to be completed. [KSC SHUTTLE STATUS REPORT, June 12, 1991.]

□

ENDEAVOUR PROCESSING: STS-49

The 17-inch disconnect has been installed on the newest Orbiter Endeavour and the 2-inch and 4-inch liquid hydrogen lines have been removed. Checks of the disconnect and main propulsion system are in progress; thermal protection system work is also proceeding. [KSC SHUTTLE STATUS REPORT, June 12, 1991.]

June 14:

TORNADO ALERT AT KSC

Work was halted briefly at Kennedy Space Center today when a tornado was sighted over the Banana River, south of the space center. The tornado warning sounded at 10:50 a.m.; employees moved into hallways and other secure locations. The warning was canceled at 11:05 a.m. and no damage or injuries were reported, according to KSC spokesman Bruce Buckingham. ["Tornado Puts KSC On Alert," FLORIDA TODAY, p. 2B, June 15, 1991.]

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COLUMBIA LANDS IN CALIFORNIA

"Now that was a great mission," Shuttle Program Director Robert L. Crippen said after Columbia landed at Edwards Air Force Base (CA) at 11:39 a.m. this morning. "Some people tell me," Crippen added, "Columbia's got a few years on it, but machines don't behave any better than that." Astronaut Stephen Oswald, speaking from Mission Control (Houston, TX) spoke to the crew of the 11-flight Orbiter, "Welcome back and congratulations on a super flight." Arnauld

Nicogossian, Director of NASA's Life Sciences Division, remarked after the landing, "We are starting to have little glimpses of new things. Some of the things that we thought were true are not true anymore; for example, how the body senses gravity and what is the memory in our body to retain that sense. I know there's a lot of happy people looking forward to analyzing the data." Within 30 minutes of landing the crew disembarked into a specially equipped van and immediately began physical examinations as part of another week of experiments and investigations. The information gleaned from the mission and the post-landing examinations is expected to pave the way for longer missions aboard Space Station Freedom and the planned flights to the moon and to Mars. [Brown, FLORIDA TODAY, p. 1A, June 15, 1991, Brown, FLORIDA TODAY, p. 5A, June 15, 1991.]

June 15: COLUMBIA: MINOR FLIGHT DAMAGE

Columbia returned to Earth with some minor damage; the re-entry charred and melted a door on the Orbiter's underside which covers the fuel lines connecting the Shuttle to its external tank. Heat did not penetrate the interior of the Orbiter. Officials speculate that a thermal protection system tile came off during launch. Columbia's Processing Manager **Bascom Murrah** said, "We don't really know yet; it's a concern, but it's a minor problem. The vehicle, once we got it up there, just performed flawlessly as far as I'm concerned. I think it was 99 percent hard work and 1 percent luck. We just had an outstanding flight." An early damage assessment showed 118 tiles dented with 22 having gouges larger than one inch. That falls within the normal range of Orbiter damage. The loose weatherstripping inside the Shuttle's payload bay was examined in California. Murrah said, "We don't see anything abnormal. We're not sure we can see much. We will do our main investigation once we get back to KSC." Murrah indicated that Columbia's braking system and tires worked well. The ferry-flight home aboard NASA's Shuttle Carrier Aircraft will begin June 19 at 11 a.m. and take two days, arriving at Kennedy Space Center June 21. The ferry flight will proceed to Biggs Air Force Base (El Paso, TX) initially, where weather will be assessed before proceeding on to Florida. [Banke, FLORIDA TODAY, p. 1A, June 16, 1991, Banke, FLORIDA TODAY, p. 5A, June 19, 1991.]

June 16: ATLANTIS PAYLOAD WORK PROCEEDS

Payload work on the STS 43 mission of Atlantis is proceeding smoothly at Kennedy Space Center where preparations were made tonight to move a TDRS satellite to Launch Complex 39A. Atlantis is currently being processed in the Orbiter Processing Facility and will be transferred to the Vehicle Assembly Building June 19 for mating with its solid rocket boosters and its external tank. Rollout to 39A will occur the following week. In California, Columbia is being readied for its return flight to KSC. It is scheduled to leave Edwards Air Force Base June 19 and return to Florida the next day. [Brown, FLORIDA TODAY, p. 2A, June 17, 1991.]

June 17: TDRS MOVED TO LC 39A

TRW's Tracking and Data Relay System satellite and its Boeing two-stage booster

were transferred today to Launch Complex 39A to await the arrival of the Space Shuttle Atlantis next week, according to KSC spokesman **George Diller**. At about 11 p.m. tonight, Atlantis will be transferred from the Orbiter Processing Facility (OPF) to the Vehicle Assembly Building (VAB) for mating with solid rocket boosters and an external tank. "Everything is on schedule, or ahead of schedule," Diller said. Liftoff is targeted tentatively for July 25, but launch officials are examining the possibility of moving up the date from three to five days. The official launch date will be set in early July following the STS 43 Flight Readiness Review. [Banke, FLORIDA TODAY, p. 6A, June 18, 1991.]



PROSPECTOR SET FOR LAUNCH, AGAIN

Prospector, the rail-launched, one-stage sounding rocket, will make its third attempt to liftoff tomorrow morning at 7 a.m. The suborbital rocket carries a package of ten experiments on a short - 13-minute - ride into space. "All systems are go. Everything looks good," said **Laura Ayres**, spokeswoman for the rocket's manufacturer, Orbital Sciences Corp. [Banke, FLORIDA TODAY, p. 6A, June 18, 1991.]



ROAD WIDENING BEHIND SCHEDULE

KSC officials expect to complete the space center's portion of the North Merritt Island road widening project on State Road 3 by August. County officials say the remainder will take another year. Primary cause of the delays: acquisition of needed property. Several property owners are fighting county attempts to take their land for the road project. [Nagy, FLORIDA TODAY, June 18, 1991.]

June 18:

PROSPECTOR DESTROYED

Technicians blew up the Prospector rocket when it went out of control shortly after launch. Ten science experiments valued at more than \$1 million were lost at sea after a Coast Guard search was called off. The Prospector lifted off late - at 7:34 a.m. - and 25 seconds into flight had to be destroyed when it swerved off course. Cameras recorded a part falling from the rear of the vehicle before it was destroyed. The rocket exploded again on impact in the Atlantic Ocean. No one was hurt in the accident. Recovery efforts for the Joust 1 payload will not be renewed June 19. The payload was apparently destroyed upon impact into the Atlantic Ocean after separating from the rocket. "We realize that failures can happen. That's part of the whole business of putting things in space," said **Charles Lundquist**, Director of the UAH Consortium for Materials Development in Space. "While we're disappointed, we're not in any way discouraged," he said. Officials of Orbital Sciences Corp. said that an investigation is underway. Review of videotapes of the launch showed an irregular burst of flame coming from the rocket's nozzle; the rocket lurched higher at first, then veered lower than its planned path. The new rocket was insured for only part of its costs. Prospector was NASA's second commercial space development center failure. A Space Services Inc. Starfire rocket failed just after launch from New Mexico in 1989. [Banke, FLORIDA TODAY, p. 5A, June 19, 1991, "Launch Abort," USA TODAY, p.

3A, June 19, 1991, JOUST 1 UPDATE, June 19, 1991, Date, THE ORLANDO SENTINEL, p. A-5, June 19, 1991.]

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THOMAS: FREEDOM DODGED A BULLET

Kennedy Space Center's Deputy Director **James "Gene" Thomas** said tonight that "Space Station Freedom dodged a bullet" in the recent Congressional vote which revived spending plans for the Space Station Project. Speaking to the opening session of a NASA-sponsored meeting on engineering for university students, Thomas went on to say, "The top management of NASA feels that if the Space Station had gone away that was the death knell for manned spaceflight." Even with the reprieve, NASA will have to find \$1 billion for program expenses within its own budget, he said. "That's discouraging, but I think it's encouraging that NASA won another one. Based on what's happened, I think the Space Station is going to have a solid future. I don't think Space Station is going to go away." The conference in Cocoa Beach, FL, included about 500 students and professors from 45 schools which participate in the University Space Research Association's advanced design program. The program gets \$1.6 million annually from NASA. [Brown, FLORIDA TODAY, p. 5A, June 19, 1991.]

June 19:

ATLANTIS MOVES TO VAB

When the Orbiter Atlantis rolled over to the Vehicle Assembly Building (VAB) from the Orbiter Processing Facility (OPF) earlier this week, it bested the post-Challenger record for shortest time spent in the OPF by 10 days. Atlantis first entered OPF Bay 2 on April 19, 1991, after its STS 37 was completed; it spent 59 days in the bay for processing for its STS 43 mission now scheduled for July 22. The previous OPF record, also held by Atlantis, was for processing the STS 36 mission. "We have had an extremely good OPF flow," said **Conrad Nagel**, NASA's Flow Director for Atlantis. "The hardware was very good to us and we had very few problems during processing." Originally, managers had hoped for a 65 day flow, but the lack of problems shortened the schedule to a record-setting pace. The Task Team Leader concept was also a contributing factor. Under this program, specific individuals are responsible for coordinating activities, getting the necessary paper work ready prior to the scheduled job, and tracking the work until the job is complete. Nagel described the program as "a real asset. It made a definite impact to our processing flow. Every day we came out of the scheduling meeting we all knew what had to be done during the next 24 hours. We could go plan our work and be sure it was going to be accomplished," he said. "I feel we can clean up the flow even more. We can roll out with not only the shortest turn around possible, but also with all the work completed, all the paper closed, and with all the requirements met. I don't want to come out of the OPF on a wing and a prayer. I want the spaceship to come out of the OPF as it is supposed to come out - ready to fly." [Buckingham, NASA/KSC NEWS RELEASE NO. 76-91, June 21, 1991, Banke, FLORIDA TODAY, p. 5A, June 20, 1991, Brown, FLORIDA TODAY, p. 1A, June 21, 1991.]



PROSPECTOR PAYLOAD BITS FOUND

Parts of the failed Prospector rocket's payload have been recovered but any hope of reflying some of the payload have vanished. "We're disappointed," said spokesman **Rick Mould** of the University of Alabama at Huntsville. "We were hoping we might find the payload intact. The rocket, but the not the payload, were insured and the insurance money may fund another project scheduled tentatively for next year. [Banke, FLORIDA TODAY, p. 5A, June 20, 1991, Date, "Searchers Find Bits of Rocket's Payload Capsule," THE ORLANDO SENTINEL, June 20, 1991.]



AMBASSADOR TO STAY TILL 1992

Ambassador, a replica of the Space Shuttle built by Guard-Lee and Co. (Apopka, FL), will remain at Spaceport USA until 1992, according to **George Meguiar**, Director of Marketing for the KSC tourist attraction. "Initially, the company wanted a place to try it out and see how it would transport and how well people reacted to it. The Shuttle is actually built in sections, which are transported in individual carriers. It took 22 semi-trucks to bring it here." The exhibit is free and visitors are able to walk inside the Shuttle's crew quarters and go up a set of stairs to the flight deck. The replica will leave Spaceport USA early next year, but Meguiar explained, "There are currently no specific plans for another replica to replace this one. But we will definitely have another one someday. That's very much a part of our objectives." [Lethbridge, STAR-ADVOCATE, June 19, 1991.]

June 20:

KSC: PRIMARY LANDING SITE!

Atlantis will land at Kennedy Space Center following its July mission and, this time, KSC will be the primary landing site, NASA said today. "We're delighted," KSC Director **Forrest McCartney** said. "It will allow us to operate more effectively and efficiently." Space business booster **Bob Allen** remarked, "Landing Shuttles at KSC will help us sell the area as a true spaceport. A company can see the logic of setting up right outside KSC if their experiments will be coming back here." Weather in Florida remains a concern and may prompt landings at California's Edwards Air Force Base; heavy payloads and two-week or more missions may also end at Edwards. The decision to start regular landings at the space center was due, in part, to the development of better brakes, improved steering and the planned addition of parachutes to the fleet. Seven of the 41 Space Shuttle launches have landed at Kennedy Space Center. In other news, NASA announced that it had rescheduled Atlantis' STS 43 mission's launch to July 22; it had previously been set for July 25. [Brown, FLORIDA TODAY, p. 1A, June 21, 1991, "KSC Gets Landing Site Role," THE ORLANDO SENTINEL, p. A-1 +, June 21, 1991, "Shuttle Landings," USA TODAY, p. 3A, June 21, 1991.]



CHEMICAL SPILL AT LC 39B

Drops of a caustic cleaner splashed on four technicians at Launch Complex 39B today. "They were seen at the health facility and released to return to work," said

J. B. Klump, spokesman with Lockheed Space Operations Co. The drops came from a bubble of sodium hydroxide during a cleaning operation designed to vent toxic nitrogen tetroxide from Orbiters. Two of the workers were soaked by the chemical and took emergency showers at the launch pad, the other two were splattered. The accident caused the pad to be evacuated briefly while officials determined if any danger existed for the remainder of the work crew. Launch Complex 39B is undergoing major modifications to prepare it for Endeavour's first launch in May 1992; no other Space Shuttle will be launched there until Endeavour's mission. The 2-inch pipe involved in the accident was being replaced by a four-inch pipe as part of the modifications. The \$3.3 million project will include some 50 modifications to enable safer Shuttle launches and more efficient launch operations. [Banke, FLORIDA TODAY, p. 5A, June 21, 1991.]

June 21:

COLUMBIA ARRIVES AT KSC

Columbia and its Shuttle Carrier Aircraft arrived at Kennedy Space Center this morning at 8:59. It was demated from the SCA and towed to the Orbiter Processing Facility (OPF) early June 22. Preparations were made for removal of the Shuttle Tailcone and for setting up the work platform configuration and other post-flight operations. A special congressional delegation was on hand at the space center to greet the returning Columbia. The representatives are members of a NASA oversight committee and had come to the Space Coast to see how NASA is spending the money it is given. Rep. Jim Bacchus (D-Orlando, FL) said, "It bothers me that people still have to work in trailers and have to walk a good ways to go to the rest room. That's not what seems to me to be the cutting edge...of high technology." The group was interested in seeing what NASA was doing in the five years since the Challenger accident. "Some of us are anxious to see in this trip what changes we've made, what precautions we've taken to avoid a similar accident. I think we'll go back with a greater confidence in what we are doing in space." [Banke, FLORIDA TODAY, p. 1A, June 22, 1991, KSC SHUTTLE STATUS REPORT, June 24, 1991.]

June 22:

ELECTRICAL CHECKS ON ATLANTIS

Atlantis must undergo important electrical and mechanical checks of connections between the Orbiter and its solid rocket boosters and external tank before rollout to Launch Complex 39A for its STS 43 mission. Rollout is scheduled for 3 a.m. June 25; launch is set for July 22. The Space Shuttle Columbia returned to Kennedy Space Center June 21 and was moved to the Orbiter Processing Facility for post-flight servicing and removal of the Spacelab payload. Later this summer Columbia will be returned to California in eight weeks for extensive modifications including the installation of new brakes and a parachute for safer landings. [Brown, FLORIDA TODAY, p. 6A, June 23, 1991, Brown, FLORIDA TODAY, p. 1A, June 24, 1991.]

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LC 39B CLOSING FOR REPAIRS

Launch Complex 39B is closing down for repairs after having launched a dozen

Space Shuttles in the past three years. Workers begin shortly a \$3.3 million modification designed to enhance safety and efficiency in the business of launching Orbiters. It will become more like LC 39A than it has been. Both pad originally were constructed for launching Saturn rockets thirty years ago. The manager in charge of LC 39B, **Buzz Brown** of Lockheed Space Operations Co., said, "In the history of aerospace, where we have had more than one launch complex, one has never been exactly like the second one. You're constantly incorporating new features." After the Challenger accidents and before flights were resumed in September 1988, modifications were begun on both pads. That work stopped at LC 39B when Discovery was ready for the Return to Flight mission (STS 26). Brown said, "We got back into the flying business faster at Pad B than Pad A did." With Columbia soon to be in California and Endeavour still not ready to fly for another year, it was thought that now is a good time to finish the modifications begun after Challenger. [Banke, FLORIDA TODAY, pp. 10E & 9E, June 23, 1991.]

June 23: ATLANTIS READY FOR ROLLOUT

Atlantis has been mated to its solid rocket boosters and to its external fuel tank. Tests of electrical and mechanical connections remain to be completed before rollout to Launch Complex 39A begins shortly after midnight tonight, according to Kennedy Space Center spokesman **Bruce Buckingham**. Call to stations for the rollout is set for 8:00 p.m. Atlantis' payload for its STS 43 mission, a Tracking and Data Relay System satellite (TDRS) is already at the pad. The new satellite will join three others already in orbit around the Earth. Atlantis' launch, expected to be July 22, will be the 42 Shuttle liftoff and fourth of this year. At LC 39A, preparations are underway to receive Atlantis; and the TDRS payload is getting its final fuel servicing.[Brown, FLORIDA TODAY, p. 1A, June 24, 1991, KSC SHUTTLE STATUS REPORT, June 24, 1991.]

June 24: STS 48/STS 49 LAUNCH PREPARATIONS

Ammonia boiler servicing and on board fuel cell system tests have been completed on Discovery in preparation for its STS 48 mission. Also completed are OMS system functional checks, flight control inspections and nose wheel steering checkouts. Payload bay door functional tests are scheduled. Underway presently are bulb seal repair work, payload bay reconfiguration, helium tank leak checks, radiator inspections, robot arm tests, and auxiliary power unit leak and functional tests. A number of operations are also in progress upon the newest Shuttle Endeavour. Checks are proceeding on the Orbiter's 17 inch disconnect, the aft compartment is being cleaned and thermal protection system work is continuing. Checks are being made of the ammonia boiler installation and the external tank door housing mechanisms. [KSC SHUTTLE STATUS REPORT, June 24, 1991.]

June 25: ATLANTIS ROLLS OUT TO LC 39A

The Space Shuttle Atlantis, on the first leg of its STS 43 mission, rolled 3 1/2 miles from the Vehicle Assembly Building to Launch Complex 39A; the journey began

at 12:55 a.m. and the Orbiter was hard down on the pad at 7:09 a.m., according to Kennedy Space Center spokesman **Bruce Buckingham**. Presently, connections between the vehicle and the launch pad are underway. Over the weekend concern had arisen over a TDRS antenna, but additional tests determined that an antenna hinge "was more flexible than we had assumed," explained TDRS Project Manager **Nicholas Chrissotimos**. Engineers had similar problems with a Galileo spacecraft antenna which has not been fully deployed. The TDRS will be installed in Atlantis tomorrow and a helium signature leak test will also be performed on the main propulsion system and the three main engines. [Brown, FLORIDA TODAY, p. 1A, June 25, 1991, KSC SHUTTLE STATUS REPORT, June 25, 1991, Brown, FLORIDA TODAY, p. 1A, June 26, 1991.]



STS 48 PROCESSING: DISCOVERY

In the Orbiter Processing Facility's Bay 1, the Space Shuttle Discovery is undergoing verification of its orbital maneuvering system electrical redundancy capability and servicing of its supply of potable water. In addition, repairs of the Orbiter's payload bay bulb seal have begun as have leak and functional tests of the auxiliary power units, thermal protection system operations and evaluation of the Tacan antennas. Discovery's three main engines will be installed over June 28 and June 29. [KSC SHUTTLE STATUS REPORT, June 25, 1991.]



POST-FLIGHT PROCESSING OF COLUMBIA

The tail cone has been removed from Columbia and preliminary inspections have been made inside the Spacelab module. Residual propellants are scheduled to be removed the auxiliary power units shortly. Post-flight processing which has already begun includes inspections of the payload bay door bulb seal, removal of ferry flight kit hardware and installation of platforms for access to various parts of the vehicle. [KSC SHUTTLE STATUS REPORT, June 25, 1991, Brown, FLORIDA TODAY, p. 1A, June 26, 1991.]



ENDEAVOUR PROCESSING OPERATIONS

Currently, ammonia boiler tubes are being installed on board Endeavour as are snaps and buttons for thermal control blankets. The right orbital maneuvering system pod has just arrived from its manufacturer and is being offloaded into the VAB's High Bay 2. [KSC SHUTTLE STATUS REPORT, June 25, 1991.]

June 26:

TDRS LOADED INTO ATLANTIS

The \$100 million Tracking and Data Relay System satellite, a key part of NASA's communications system, was loaded into the Space Shuttle Atlantis today in preparation for the STS 43 mission. Atlantis is expected to be launched July 22. **John Blaha**, Mission Commander for STS 43, commented, "We're very excited about getting on with the mission. The crew's been together for about a year planning to do this mission. We're looking forward to it. It's going to be a challenging mission." Blaha's crewmates include: Pilot **Michael Baker**, and

Mission Specialists Shannon Lucid, James Adamson and G. David Low. Lucid will be making her third flight; Adamson and Low will each be making his second trip into space. [Brown, FLORIDA TODAY, p. 4A, June 27, 1991.]

June 27: ATLAS FAILURE BLAMED ON DEBRIS

A bit of debris may have been at fault in the Atlas rocket failure last April, according to accident investigators. "We'll never know for sure, but it probably was a bolt, a washer or some foreign object that caused the engine's turbomachinery to seize up. Then everything stopped and the rocket tumbled," said General Dynamics Corp. spokesman Jack Isabel. The rocket and its payload - a Japanese television satellite - were destroyed six minutes after launch on April 18 from Cape Canaveral Air Force Station. According to Isabel, an investigative team studied flight data for two months before concluding that debris must have jammed the engine turbopump. These findings clear the way for the remaining three Atlas flights scheduled for this year. [Halvorson, FLORIDA TODAY, p. 4A, June 28, 1991.]

□ LEAK CHECKS ON ATLANTIS

Electrical connections between Atlantis and its payload -a Tracking and Data Relay Satellite - are being completed today and other workers are preparing to check the Orbiter's propulsion system for leaks tomorrow. Preparations have also begun for loading propellants into Atlantis' onboard storage tanks and power system. The Orbiter is scheduled to launch July 23 for a nine-day mission which, besides deploying the TDRS, will be devoted to science and medical experiments. [Brown, FLORIDA TODAY, p. 4A, June 28, 1991.]

□ M.A.P. MECHANICAL CONTRACT

M.A.P. Mechanical Contractors, Inc. (Homestead, FL) has been awarded a \$1,675,000 contract to increase the capacity of the Orbiter Processing Facility (OPF) high bay HVAC/chilled water systems. The current HVAC system (heating, ventilating and air conditioning) is old and showing signs of deterioration and corrosion. Some operations performed in the OPF, such as the bonding of the thermal tiles on the Orbiter, are very temperature sensitive. The modifications will ensure an environment in which the temperature and humidity levels can be controlled. [Stoaley, NASA/KSC News Release No. 79-91, June 27, 1991.]

June 29: KSC TEAM LAUNCHES SCOUT AT VAFB

A four-stage Scout rocket was successfully launched by a 25-member team from Kennedy Space Center today at Vandenberg Air Force Base in California. The Scout carried a 212-pound satellite into orbit. "It was beautiful. We saw it all the way through third stage ignition," said Jim Meyer, Test Controller for the launch team. The Scout launch was the first directed by a KSC launch team, according to Meyer. At Kennedy Space Center, technicians continued to prepare Atlantis for its late July launch. Electrical and mechanical connections between the Orbiter

and its TDRS cargo were tested and the Shuttle's engine valves and sensors were calibrated. ["NASA to Launch Scout Rocket Friday," FLORIDA TODAY, June 23, 1991, Halvorson, FLORIDA TODAY, p. 1A, June 30, 1991.]

JULY

July 1:

STS 43 PROCESSING: ATLANTIS

The crew of STS 43 arrives today at 3 p.m. to prepare for tomorrow's Terminal Countdown Demonstration Test; call to stations is set for 8 a.m and the test will run until 11 a.m. July 3. An end-to-end test of the Tracking and Data Relay Satellite is in progress at Launch Complex 39A. Work completed at the pad includes a helium signature leak test of the three main engines and the main propulsion system, a payload to Orbiter interface verification test, final connections between the launch pad and the vehicle and a main engine flight readiness test which calibrates engine valves and sensors. A Launch Readiness Review is scheduled for July 8 and a Flight Readiness Review is scheduled for July 11-12. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

□

STS 48 PREPARATIONS

Two of the three Shuttle Main Engines have been completely installed; the third is currently being installed. An external tank door functional test has been completed on Discovery in preparation for its STS 48 (UARS) mission. Discovery's potable water system is being serviced and the Orbiter's payload bay bulb seal is also being repaired. The auxiliary power units are undergoing leak and functional tests. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

□

COLUMBIA'S POST-FLIGHT PROCESSING

The Spacelab module and getaway special beam have been removed from Columbia as part of the post-STS 40 processing. Work is underway to remove the forward reaction control system on July 2 and inspect the payload bay door bulb seal. Ferry flight kit hardware is being removed and technicians are preparing to drain residual fuels from the auxiliary power units; there is also some work being done on the Orbiter's thermal protection system. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

□

ENDEAVOUR'S STS 49 PROCESSING

Work continues in preparation for Endeavour's first mission, STS 49. Leak checks of the main propulsion system are in progress as are the installation of covers on the main propulsion system lines, brazing water lines into the environmental control life support system, mounting the external tank umbilical door drive mechanism and brazing in lines for the ammonia boiler. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

□

ATLANTIS CREW ARRIVES FOR TEST

The STS 43 crew arrived at Kennedy Space Center today to take part in a Terminal Countdown Demonstration Test which begins at 8 a.m. tomorrow and runs until 11 a.m. July 3. Bruce Buckingham, spokesman for KSC, said, "It will

give the astronauts and the launch team an opportunity to go through real live launch-day activities without actually having to launch." Mission Specialist **James Adamson** arrived early in the day and was followed to the space center in T-38 training aircraft by Commander **John Blaha**, Pilot **Michael Baker** and fellow Mission Specialists **Shannon Lucid** and **G. David Low**. Tomorrow the crew will practice emergency egress procedures at Launch Complex 39A. On the morning of July 3, the entire crew will put on flight suits and board the Orbiter for the final hours of the practice countdown. [Halvorson, FLORIDA TODAY, p. 4A, July 2, 1991.]

July 2:

DELTA 2 LIFTOFF TONIGHT

A Delta 2 rocket is scheduled to liftoff tonight at 10:36 from Cape Canaveral Air Force Station's Launch Complex 17; the launch window extends until 11:07 p.m. The Air Force's Delta 2 will carry a \$65 million Navstar Global Positioning System satellite which will join 15 other such spacecraft in orbit 12,000 miles above Earth. Eight more satellites must be launched to complete the planned 24-satellite system. There is a 60 percent chance of favorable weather for the launch, but forecasters are concerned about electrically charged clouds in the area. [Halvorson, FLORIDA TODAY, p. 4A, July 2, 1991.]

□

COUNTDOWN DEMONSTRATION TEST

"The vehicle really looks good. We're ready to go for our nine-day space mission," said Atlantis Commander **John Blaha**. The crew spent this afternoon at Launch Complex 39A, inspecting the Orbiter's Tracking and Data Relay Satellite payload and practicing emergency escapes from the launch pad. Blaha noted that the launch pad evacuation bunker is now equipped with oxygen hoses that can be connected directly to flight suits. Before, astronauts would have had to open their helmets to obtain oxygen. The TCDT is scheduled to end tomorrow at 11 a.m.; a firm launch date will be set next week following the mission's Flight Readiness Review. [Brown, FLORIDA TODAY, p. 13A, July 3, 1991.]

□

DELTA 2, ONE MORE TIME

A storm in Virginia prevented the launch of an Air Force Delta 2 at Cape Canaveral Air Force Station tonight; a second attempt will be made July 3. Bad weather shut down a ground station in Virginia which relays information about the rocket's flight path from a South Atlantic tracking station. The launch is scheduled to occur at 10:32 p.m. The last Air Force Delta flight took place seven months ago; between the two launches was used to begin needed repairs on two Delta launch pads. A March 1991 Air Force report warned of the deterioration of the two pads: "Catastrophic failure of both towers is possible should they experience winds which approach structural design limits. The confidence level that the service towers will remain safe for the next two or three launches is very low." Repairs have now been made, according to the Air Force. "It's absolutely safe, otherwise we wouldn't be launching," said Air Force Lt. Col. **James Jannette**. [Brown, FLORIDA TODAY, p. 1A, July 3, 1991, Date, THE ORLANDO SENTINEL, July 3, 1991.]

July 3:

DELTA LAUNCHED SUCCESSFULLY

"Everything looks very good, very clean," said **Skip Mackey**, Chief of a team which tracks the flight of rockets as a Delta rocket carrying a Navstar Global Positioning System satellite was successfully launched tonight at 10:32 p.m. from Launch Complex 17A. The launch marked the delivery of the 11th GPS satellite into orbit; when completed the navigational system will include 24 satellites. The launch had been threatened by the prospect of rainy weather. [Brown, FLORIDA TODAY, p. 1A, July 4, 1991, Date, THE ORLANDO SENTINEL, July 4, 1991.]

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BOTTOM FELL OFF PROSPECTOR ROCKET

Investigators know that the Prospector rocket went off course because the bottom of the rocket fell off; what they don't know yet is why. "We still are investigating the precise mode of failure," said **Laura Ayres**, spokeswoman for manufacturer Orbital Sciences Corp. She said that investigators found no indication that the rocket's motor, guidance or control system contributed to the rocket's failure. She added that investigators are still trying to determine whether an unanticipated recirculation of exhaust gases within the rocket played a role in the accident and that a rapid flapping of the rocket's fins as the vehicle reached speeds of about 700 mph might also have contributed to the failure. [Halvorson, FLORIDA TODAY, p. 13A, July 3, 1991.]

□

DRESS REHEARSAL GOES WELL

"Everything went smoothly," said Kennedy Space Center spokesman **Bruce Buckingham** of the just completed Terminal Countdown Demonstration Test. During the test, the STS 43 crew of Commander **John Blaha**, Pilot **Michael Baker** and Mission Specialists **G. David Low**, **Shannon Lucid** and **James Adamson** practiced an emergency escape from the launch tower at Launch Complex 39A. During the day, pad technicians prepared to load toxic propellants into Atlantis to power its orbital maneuvering units and steering thrusters; the loading begins May 8. Pad workers also tested the doors near the trailing edge of Atlantis' right wing. Tomorrow, only a skeleton crew of security and safety workers will be on hand at KSC as the space center closes down for the July 4 holiday. [Banke, FLORIDA TODAY, p. 12A, July 4.]

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DELTA PADS GET REPAIRS IN 1992

"We'll build our launch schedule based on using one pad at a time. We will not have dual pad operations," said Delta Program Commander Lt. Col. **Randolph Moyer**. The two Delta launch pads run by the Air Force will be closed down one at a time next year to undergo repairs made necessary by corrosion of the 30 year-old towers. He said launch operations on the pads will be suspended from three to five months at a time. Moyer also said that repairs made on Launch Complex 17A just prior to tomorrow's Delta launch were sufficient to eliminate critical concerns and that a complete structural analysis of the pad is underway.

Work at LC 17B was not deemed as critical. [Brown, FLORIDA TODAY, p. 12A, July 4, 1991.]

July 5:

SAILORS ARRESTED AT KSC

Security officers at Kennedy Space Center arrested two sailors from Massachusetts who made a navigational error and mistakenly anchored near a Space Shuttle launch pad. Thomas Hamilton and Paul O'Leary (Brookline, MA) said they became lost in the Intercoastal Waterway and anchored to a small island in the Banana River. The two were released on their own recognizance. An investigation is underway to discover how security was broken. [Banke, FLORIDA TODAY, p. 1A, July 6, 1991.]

July 6:

LOCKHEED AWARD WINNERS

Lockheed Space Operations Co. announced that Carla King (Orlando, FL) has been named Shuttle Processing Contract Employee of the Month Award. Supervisor of the Month was awarded to Tom Studstill (Titusville, FL). King is a senior software engineer and is responsible for analyzing launch processing problems, meeting with engineers to clarify details and writing problem specifications and defining methods of solutions. Studstill supervises 11 people in the Finance-Logistics-Performance Measurement group in Lockheed's Business Systems Department. ["Employee, Supervisor Reap Space Awards," FLORIDA TODAY, p. 9E, July 7, 1991.]

□

HELLING WINS SAFETY AWARD

Kennedy Space Center Director Forrest S. McCartney presented the Director's Award for Outstanding Safety Performance to Dean Helling, General Manager of Boeing Aerospace Operations, Inc.'s Engineering Support Contract. The award is based on a point system involving lost-time accidents, damage to hardware, work place inspections, job surveillance and timely submittal of reports. ["Boeing Group Wins KSC Safety Award," FLORIDA TODAY, p. 9E, July 7, 1991.]

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HOLIDAY BREAK ENDS AT KSC

A four-day holiday break ends for Kennedy Space Center workers tomorrow as preparations for a July 23 launch of Atlantis resumes. Thermal protection system work on each Orbiter continues July 7. The STS 43 Flight Readiness Review begins July 11 and a definite launch date for the mission will be set at the conclusion of that review. [Banke, FLORIDA TODAY, p. 4A, July 6, 1991, Banke, FLORIDA TODAY, p. 4A, July 7, 1991.]

July 8:

LAUNCH READINESS REVIEW

Kennedy Space Center managers meet today to discuss whether the Space Shuttle Atlantis and its TDRS payload are ready to be launched on July 23. According to KSC spokeswoman Lisa Malone, managers will discuss how pre-

launch tasks are proceeding and determine when the space center will be ready to launch the Orbiter. Launch Complex 39A will be closed to all except essential workers as toxic propellants are loaded onboard Atlantis. Technicians will wear special safety garments for protection against leaks or toxic vapors while the loading operation is underway. The pad will reopen late on July 9. [Banke, FLORIDA TODAY, p. 1A, July 8, 1991.]

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LRR CONTINUED

KSC managers completed the STS 43 Launch Readiness Review this afternoon without identifying any significant issues. KSC Launch Director **Bob Sieck** said, "KSC is proceeding toward the safe and successful launch and landing of Atlantis the end of this month." The managers are recommending a launch on July 23. While the managers met, the five members of the STS 43 crew were at Kennedy Space Center to inspect the Upper Atmosphere Research Satellite they will deploy. Commander **John Creighton** said, "This is very much an environmental mission." Mission Specialist **John Buchli** added, "It's the type of thing, in my mind, will give environmentally oriented scientists a lot of data to look at and really fine-tune their thinking." The FRR begins July 11. [Banke, FLORIDA TODAY, p. 1A, July 9, 1991, STS-43 LAUNCH READINESS REVIEW, July 8, 1991.]

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NIGHTTIME LANDING PLANNED

Discovery Commander **John Creighton** is practicing for the first-ever landing at Kennedy Space Center after dark. "In my opinion a night landing is a little more difficult than a day landing," he said of the planned conclusion to the Orbiter's STS 48 mission. Launch of the mission is expected to be September 12 with landing coming five days later at 1:30 a.m. at KSC. [Date, THE ORLANDO SENTINEL, p. 2A, July 9, 1991.]

July 9:

LAUNCH PROCESSING: STS 43

The Launch Readiness Review for STS 43 has been completed at KSC; the Flight Readiness Review begins at the space center July 11 and is completed the following day with the announcement of a firm launch date for the mission. The target date is presently July 23. Currently underway at Launch Complex 39A is the loading of hypergolic propellants into Atlantis' reaction control system and orbital maneuvering system storage tanks. During the loading operation, the pad is closed to all non-essential personnel. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

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LEAKY VALVES ON ATLANTIS

Technicians wearing special safety suits replaced two leaking oxidizer valves aboard Atlantis today at Launch Complex 39A. The valve problem has put a hazardous fuel loading operation behind schedule, but Kennedy Space Center officials remained confident that the July 23 launch date could be met. Loading is expected to be completed July 10, about 12 to 16 hours behind schedule,

according to spokeswoman Lisa Malone. Meanwhile, routine pad work continues as workers open the payload bay doors of Atlantis to conduct final pre-launch preparations on its STS 43 payload, a \$100 million Tracking and Data Relay Satellite. [Banke, FLORIDA TODAY, p. 5A, July 10, 1991.]



FIRE AT CAPE CANAVERAL COMPLEX

A small electrical fire took place today at Launch Complex 40 at Cape Canaveral Air Force Station; it began about 4:45 p.m. and lasted about an hour. An investigation is underway and the pad is being inspected for damage. The next launch from the pad is scheduled for September - a mission to deploy NASA's Mars Observer spacecraft; officials were unsure whether today's fire would delay the mission, according to Air Force spokeswoman Terri Brasher. The pad had not been used since June 1990 for the launch of a commercial Titan 3 carrying a communications satellite. [Banke, FLORIDA TODAY, p. 5A, July 10, 1991.]



RUNWAY WORRIES NASA MANAGERS

NASA's managers are concerned that the rough surface of the Shuttle Landing Facility runway might shred the tires of Atlantis if it is allowed to land at Kennedy Space Center after its STS 43 mission. "Some people would prefer to wait until new tires are installed on the Shuttles," said NASA spokesman Ed Campion. On an unplanned landing of Discovery in May, the Orbiter's tires shredded; the space agency is developing more durable tires for the fleet of Shuttles. [Brown, FLORIDA TODAY, p. 1A, July 10, 1991.]



DISCOVERY WORK PROGRESS: STS 48

Connection of the main engine interfaces have been completed in processing operations conducted upon the Space Shuttle Discovery in preparation for its STS 48 mission. Work in progress includes: Crew Equipment Interface Test with STS 48 flight crew; installation of heat shields around the main engines; tests of the Ku-band antenna; closeouts of the aft compartment; installation of the Orbiter's tires; repair of the payload bay bulb seal; thermal protection system operations. Work scheduled to be completed includes: functional test of the galley; payload bay inspections and cleaning; and rollover to the Vehicle Assembly Building in about two weeks. In the VAB's High Bay 3, mating the right aft center segment of Discovery's solid rocket boosters is underway as are preparations for mating the right forward center segment. Stacking of the motor segments for the left booster is scheduled for next week. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]



COLUMBIA: POST-FLIGHT PROCESSING

Technicians continue to prepare the Space Shuttle Columbia for its trip to California for extensive modifications; the removal of auxiliary power unit no. 3 has been accomplished. Work underway includes: venting the orbital maneuvering system helium tanks; removal of the power reactant storage and distribution

system tanks; removal of the heat shields from around the main engines; payload bay door bulb seal inspection and thermal protection system operations. Work scheduled to be done involves the removal of Columbia's brakes; offloading residual propellants this weekend; removal of the two orbital maneuvering system pods this weekend and early next week. Columbia will be ready for its ferry flight to Palmdale (CA) in early August. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

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ENDEAVOUR PROCESSING: STS 49

Endeavour is scheduled to undertake its first flight (STS 49) next year to rescue an Intelsat satellite, but processing work has been underway since its arrival at KSC in May. That work includes installation of the Orbiter's ammonia boiler; leak checks and inspections of the main propulsion system; installation of covers on the main propulsion system lines; installation of insulation on the auxiliary power units and preparations to perform leak checks of the freon coolant loops. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

July 10:

FLIGHT READINESS REVIEW TODAY

NASA managers will answer several questions when they meet at Kennedy Space Center today for the STS 43 Flight Readiness Review. They will review Atlantis' readiness for flight, set a definite launch date and decide whether KSC will be the primary landing site for the mission. Some officials have questioned whether Atlantis' tires are durable enough to withstand the stress of landing on the Shuttle Landing Facility's rough runway. Discovery had tire and brake damage when it made an unplanned landing at KSC in May. Yesterday technicians loaded propellants onboard the Orbiter; LC 39A will be reopened for other launch pad activities today. [Brown, FLORIDA TODAY, p. 6A, July 11, 1991, Date, THE ORLANDO SENTINEL, July 11, 1991.]

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ATLANTIS PAD WORK CONTINUES

At Launch Complex 39A, technicians replaced two reaction control system oxidizer quick disconnects; the valves had been stuck in the open position which delayed the hypergolic loading operation. No impact is expected on the launch target date of July 23. In addition, pad workers loaded oxidizer into the Orbiter's storage tanks. During these operations the pad was closed to all non-essential personnel. [KSC SHUTTLE STATUS REPORT, July 10, 1991.]

July 11:

CRIPPEN STATEMENT: KSC LANDINGS

Shuttle Director **Robert L. Crippen** announced today that KSC will be the primary landing site for STS-43. "This decision has been briefed to, and concurred with, by management officials at all levels within NASA. The KSC landing is going to be approached in a conservative manner using very restrictive flight rules to ensure the safety of the vehicle and crew. Consequently, there is a high probability that the landing could be at Edwards Air Force Base and the program

is prepared to handle a landing at either site." Bad weather - rain, high winds or cross winds - at Kennedy Space Center would send the Orbiter to a landing at Edwards Air Force Base, CA. There are 22 runways at Edwards located on a huge dry lake bed. KSC has two runways, both surrounded by water. [STATEMENT FROM SHUTTLE DIRECTOR Robert L. Crippen REGARDING KSC LANDING, July 11, 1991, Brown, FLORIDA TODAY, p. 1A, July 12, 1991, Date, THE ORLANDO SENTINEL, July 12, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-14, July 14, 1991.]



SOVIET VISITORS AT KSC

Kennedy Space Center hosted a group of high-level Soviet space officials at the beginning of an eight-day cross-country tour of NASA facilities. The Soviets began their overview of NASA with a tour of the Shuttle launch site. KSC Forrest S. McCartney greeted the 15-member delegation and hosted a luncheon in their honor. The group also saw the Launch Control Center, the Orbiter Processing Facility, Vehicle Assembly Building and several launch pads. Among the delegates were Oleg Nikolaevich Shishkin, Minister of General Machine Building and Yuriy Semyenov, General Director, Chief Designer of the Soviet's heavy-lift booster Energia. The group heads for Marshall Space Flight Center (Huntsville, AL) July 12 and will subsequently visit Stennis Space Center (MS), Johnson Space Center (Houston, TX) and Goddard Space Flight Center (Greenbelt, MD). [Brown, FLORIDA TODAY, p. 1A, July 12, 1991.]



STS-43 LAUNCH PREPARATIONS

The Flight Readiness Review for STS 43 began today at Kennedy Space Center and will conclude July 12. During the day, pad technicians concluded hypergolic propellants loading; they opened the pad for routine work and opened the payload bay doors to complete pre-launch preparations on the TDRS-E payload. Technicians continue work to closeout the Orbiter's Flipper Door and to check for leaks in the auxiliary power units and to check hydraulic circulation. Hydraulic operations, disconnects, and retests remain to be completed; also scheduled for completion are elevon retests, TDRS battery charge operations, aft compartment closeouts and installation of the Extravehicular Mobility Unit. [KSC SHUTTLE STATUS REPORT, July 11, 1991.]



STS 48 DISCOVERY PROCESSING

Main landing gear wheel and tire installation have been completed upon Discovery in preparation for the Orbiter's STS 48 mission; also completed are the heat shield's installation and preparation for hypergolic operation. Hydraulic operations are scheduled. Work is in progress for other integrated hydraulic operations, main engine and aft compartment closeouts, bulb seal repair work, nose landing gear wheel and tire installation and service freon coolant lines. [KSC SHUTTLE STATUS REPORT, July 11, 1991.]



COLUMBIA/ENDEAVOUR PROCESSING WORK

Columbia's SLS Tunnel Adapter and support equipment have been removed and post-mission propellant deservicing has been scheduled. Still in progress is work to remove the Power Reactant Storage and Distribution System tanks, auxiliary power unit system preparations for sending the Orbiter to Palmdale, CA, thermal protection system operations and removal of the main landing gear brakes. The processing of the Space Shuttle Endeavour continues as well. The work in progress includes: ammonia boiler installation, installations of auxiliary power unit insulation, nose landing gear hydraulic operations and water spray boiler line checks. [KSC SHUTTLE STATUS REPORT, July 11, 1991.]

July 12:

STS 43 LAUNCH DATE

NASA managers today set July 23, 1991, as the launch date for the next flight of the Space Shuttle system. The STS-43 mission will see the Atlantis and its crew of five astronauts conduct a mission highlighted by the deployment of the fifth Tracking and Data Relay Satellite (TDRS-E). The launch window on July 23rd opens at 10:54 a.m. EDT. The flight, which is a little less than 9 days in duration, is scheduled to land on August 1 at either Kennedy Space Center or Dryden Flight Research Facility, (Edwards, CA), depending on weather conditions at those sites. Shuttle Director Robert L. Crippen commented [see article following], "The launch team did a superb job getting Atlantis and its payloads ready for flight. The experience we gain with the processing of each mission allows us to have smoother flows and that showed in the Atlantis being processed in record time." Taking note of concerns about landings at KSC, Crippen also said that extremely restrictive weather requirements for landings here will preclude situations that could damage Atlantis' tires. Landings at KSC save the space agency about \$1 million - the cost of ferrying the Orbiter back to the space center. [Halvorson, FLORIDA TODAY, p. 6A, July 13, 1991, NASA NOTE TO EDITORS: SHUTTLE MISSION STS-43 LAUNCH DATE ANNOUNCED, July 12, 1991.]



CONTINGENCY SPACE SUITS STORED

Two contingency space suits have been installed aboard the Space Shuttle Atlantis and tests of the suits are underway in preparation for its July 23 STS 43 mission. Payload closeouts were continuing as was battery charging on the Tracking and Data Relay Satellite which is the primary cargo on next week's flight. The elevon flipper doors are being closed out as is the aft compartment. The hydraulic system is being prepared for flight. A number of tasks have been scheduled: continued charging of TDRS batteries and its Inertial Upper Stage. Launch countdown preparations will be started and vehicle ordnance devices must be installed and tests of the firing circuits must be conducted next week as well. The Orbiter's hypergolic propellant system tanks must be pressurized; the launch countdown begins at 4 p.m. EDT July 20 with launch coming at 10:54 a.m. EDT on July 23. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]



DISCOVERY PRE-LAUNCH PREPARATIONS

Discovery's new tires have been installed and tests of its Ku-band antennas have been completed prior to the Orbiter's STS 48 mission. Work in progress includes: integrated testing between the main engines and main propulsion system; tests of the closed circuit television communications system; installation of heat shields around the main engines; closeouts of the aft compartment and avionics bays; thermal protection system operations. Scheduled work includes: cycling payload bay doors; inspecting and cleaning the payload bay and rolling over Discovery to the Vehicle Assembly Building on July 22. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]



COLUMBIA: POST-LAUNCH WORK

Reaction control system and orbital maneuvering system helium tanks have been vented aboard Columbia and a simulated forward reaction control system has been installed in the Orbiter. Preparations are being made to offload the residual propellants from the auxiliary power units, orbital maneuvering system and reaction control system tanks. Removal of the power reactant storage and distribution system tanks has begun; the heat shields from around the main engines are being removed. Thermal protection system operations are underway and the payload bay door bulb seal is being inspected. Brake removal has been scheduled; residual propellants will be offloaded this weekend to ready Columbia for its ferry flight to Palmdale, CA, in early August. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]



ENDEAVOUR'S PROCESSING PROGRESS

Though leak checks of freon coolant loop number one has been completed, Endeavour is scheduled to undergo a number of other processing activities: installation of panels in the crew cabin; installation of lines for the main propulsion system; leak checks of freon coolant loop number 2; installation of covers on the main propulsion system lines; thermal protection system operations; installation of insulation on the auxiliary power units. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]

July 14:

GUPPY TO RETIRE

NASA's "Super Guppy" which has carried two million pounds of cargo - including the Hubble Space Telescope and jet fighters - to Kennedy Space Center is retiring after twenty-five years of service to the space agency. Its pilot, speaking of the plane, said, "It's like a flying dinosaur." Cargo is loaded through the front of the plane which is swung open; on takeoffs the Guppy's nose gear leaves the ground after the main gear and reverses the process for landings. The plane is being retired because it needs four new engines and re-enforced wings and NASA cannot afford the \$6 to \$10 million needed to repair the airplane. [Banke, FLORIDA TODAY, July 14, 1991.]

July 16:

ATLANTIS: FAILED POWER SUPPLY

During power up this morning, there was an indication of a failed power supply with MDM FA3. This electronic component, part of the Orbiter's data processing system, is located in the aft compartment in avionics bay 6. The function of the MDM is to interpret data between the Orbiter's major components and the general purpose computers. Engineers are troubleshooting the box to determine the exact problem. At Launch Complex 39A, the external tank has been purged and ordnance devices have been installed on Atlantis in preparation for its July 23d mission to deploy the TDRS-E. In progress work includes: connections of the Inertial Upper Stage batteries; payload closeouts; trickle charging of the Tracking and Data Relay Satellite (TDRS) batteries; closeouts of the Orbiter's aft compartment and launch countdown preparations. The tasks remaining to be completed include: a simulated payload countdown tonight; purges of the power reactant storage and distribution system tomorrow; pressurization of the Orbiter's hypergolic propellant system tanks July 17; tests and final connections of the ordnance firing circuits July 18. The flight crew of Commander **John Blaha**, Pilot **Michael Baker** and Mission Specialists **G. David Low**, **Shannon Lucid** and **James Adamson** arrives at Kennedy Space Center at 1:00 p.m. July 20; the launch countdown begins at 4:00 p.m. heading for a launch July 23 at 10:54 a.m. EDT. [KSC SHUTTLE STATUS REPORT, July 16, 1991, Date, THE ORLANDO SENTINEL, July 17, 1991.]

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SPACEPORT USA CELEBRATES 25 YEARS

"This is where America can come and see the launch site - not only to look at what we have done over the past 30 years but to dream of the future," said Kennedy Space Center Director **Forrest S. McCartney** at the 25th anniversary celebration of the space center's visitors center held today at Spaceport USA. During the past 25 years, 43.5 million persons have visited Kennedy Space Center "to see our space program firsthand," as McCartney put it. The occasion also honored four employees who have been with the visitors center since it opened: tour bus drivers **Joseph Wallace, Jr.** and **Dorris Williams**, cash control agent **Sallye Foster** and marketing representative **Burton Prince**. The 22nd anniversary of the Apollo 11 launch was also noted with Center Director McCartney saying, "There are no footprints [on the moon] that aren't an American's. And it's not just one footprint; there are 24 footprints up there." Spaceport USA General Manager **Donn Hennessy**, referring to the planned \$30 to \$40 million expansion of the attraction, said, "It depends on current cash flow. But I'd like to break ground on it in 1994." The expansion would focus on the Apollo-Saturn V space program. Despite the recession in 1990, a record 3.1 million persons toured the attraction which competes for tourists with Walt Disney World, Epcot Center, Disney-MGM Studios, Sea World and Busch Gardens. ["Spaceport USA Celebrates Anniversary," FLORIDA TODAY, p. 2B, July 17, 1991, Harris, FLORIDA TODAY, pp. 1A-2A, July 16, 1991.]



STS-43: SRB PROBLEM

A circuit which sends signals from an electronics unit to a separation motor on the right booster of Atlantis gave no reading during a test at Launch Complex 39A today. Further testing will take place tomorrow in an attempt to locate the site of the problem. If the electronics box must be replaced launch will be delayed one day. Another problem threatened to delay the launch, when circuitry within an electronics box in Atlantis' rear engine compartment failed during a test; examinations which took all day showed that the problem was within circuitry used only for tests and not for flight, according to NASA spokeswoman Lisa Malone. [Halvorson, FLORIDA TODAY, p. 1A, July 17, 1991, KSC SHUTTLE STATUS REPORT, 6:30 p.m., July 16, 1991]



STS 48 PROCESSING WORK

The Space Shuttle Discovery has a number of processing operations underway at present: troubleshooting of a cabin pressure transducer; inspections of main propulsion system screams; cleaning the payload bay; installation of ordnance devices; leak checks of auxiliary power unit no. 3; closeouts of the aft compartment and avionics bays; thermal protection system operations. Work scheduled to be completed includes: Orbiter positive pressure leak checks; cycling payload bay doors; payload bay inspections and cleaning; determining Orbiter weight and its center of gravity and rollover of Discovery to the Vehicle Assembly Building on July 22. [KSC SHUTTLE STATUS REPORT, July 16, 1991.]



COLUMBIA: FERRY-FLIGHT PREPARATIONS

Technicians in Orbiter Processing Facility's Bay 2 have disconnected ground support equipment used in offloading residual propellants from the auxiliary power units, orbital maneuvering system and reaction control system tanks. Work remaining to be completed includes: preparations to remove the ammonia boiler aboard Columbia; removal of the power reactant storage and distribution system tanks; removal of heat shields from around the main engines; payload bay door bulb seal inspections; thermal protection system operations. The Orbiter is now ready for ferrying to Palmdale, CA, for extensive modifications. [KSC SHUTTLE STATUS REPORT, July 16, 1991.]



ENDEAVOUR'S PROCESSING FOR STS 49

Work underway on Endeavour in behalf of its maiden mission, STS 49, includes: installation of panels in the crew cabin; installation of lines for the main propulsion system; leak checks of freon coolant loop no. 2; installation of covers on the main propulsion system lines; thermal protection system operations; installation of insulation on the auxiliary power units. The newest Orbiter will be transferred to OPF Bay 1 on July 22. [KSC SHUTTLE STATUS REPORT, July 16, 1991.]

July 17:

ATLANTIS: ELECTRONICS UNIT REPLACEMENT

Kennedy Space Center managers decided today to replace a suspect electronics unit on Atlantis; the unit - an Integrated Electronics Assembly - controls ignition and separation of the Orbiter's right solid-rocket booster. KSC spokeswoman Lisa Malone said, "It does make the schedule tighter, but we can still make it [the launch target of July 23]." The malfunctioning unit also controls deployment of the SRB's parachutes after dropping away from the Shuttle and its external tank. The difficulty with the unit was evidenced by testing at Launch Complex 39A July 16; circuits failed to give readings indicating separation. The decision to replace the electronics unit came after further tests showed the circuits were functioning properly, Malone said. The replacement will be installed and tested tomorrow. No launch delay is expected. In other prelaunch pad activities, workers completed connections of the Inertial Upper Stage batteries. Troubleshooting of multiplexer demultiplexer (MDM) FA3 was finished. After a series of tests and conferences with the vendor, officials determined that the MDM is flight worthy and there is no concern with the power supply. The function of the MDM is to interpret data between the Orbiter's major components and the general purpose computers. Other work in progress prior to the flight includes: a simulated payload countdown; closeouts of the aft compartment; disconnection, replacement and retest of the forward integrated electronic assembly (IEA) on the right solid rocket booster; payload closeouts; trickle charging of the Tracking and Data Relay Satellite (TDRS) batteries. The schedule for further work at LC 39A includes: purges of the power reactant storage and distribution system (July 19); pressurization of the Orbiter's hypergolic propellant system tanks for flight (July 19); final ordnance preparations (July 19); arrival of the five-member crew at 1:00 p.m. July 20. [Halvorson, FLORIDA TODAY, p. 7A, July 18, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., July 17, 1991, "Despite Repair, Shuttle Is to Fly on Tuesday," THE NEW YORK TIMES, p. A11, July 18, 1991.]

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STS 48 PROCESSING: DISCOVERY

Aboard Discovery in OPF Bay 1, a panel in the Orbiter's middeck associated with a failed cabin pressure transducer (sensor) has been removed. Inspections of Discovery's main propulsion system screens are underway as is cleaning of the payload bay. Other work currently being performed on the Orbiter include: leak checks of auxiliary power unit no. 3, closeouts of the aft compartment and avionics bays, thermal protection system operations and positioning of the main landing gear strut. Work scheduled: Orbiter positive pressure leak checks, cycling of payload bay doors, payload bay inspections and cleaning, determining Orbiter weight and center of gravity and a July 24 rollover to the Vehicle Assembly Building. Work continues in preparing the solid rocket boosters for mating with Discovery. Columbia is undergoing final preparations for its ferry-flight to Palmdale, CA, where it will undergo major modifications. Technicians have completed disconnecting ground support equipment used in offloading residual propellants from the auxiliary power units, orbital maneuvering system and reaction control system tanks. Work has been done to remove the Shuttle's Ku-band antenna, dry the Orbiter's main engines, prepare for removal of the vehicle's

ammonia boiler and its power reactant storage and distribution system tanks and heat shields from around the main engines. Payload bay door bulb seal inspections remain to be done and there are further thermal protection system operations to be undertaken. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 17, 1991.]

II

STS 49: INTELSAT RESCUE MISSION

The newest Space Shuttle - Endeavour - is undergoing preparations for its STS 49 Intelsat Rescue mission and for the vehicle's rollover to OPF Bay 1 on July 24. Freon coolant loop no. 1 and 2 pressure testing is complete. Work in progress: installation of panels in the crew cabin; installation of the payload bay door drive shaft; installation of lines for the main propulsion system; installation of covers on the main propulsion system lines; thermal protection system operations and installation of insulation on the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 17, 1991.]

July 18:

IEA REPLACED IN ATLANTIS

A new integrated electronics assembly has been installed on Atlantis' right solid rocket booster in the place of a suspect assembly discovered in pre-launch testing activities at Launch Complex 39A. Engineers still don't understand why the original assembly's circuitry failed. The new assembly is now undergoing testing. A simulated payload countdown has also been completed. Also underway are purges of the power reactant storage and distribution system as well as trickle charging of the Tracking and Data Relay Satellite batteries. Tomorrow, pad technicians at LC 39A will pressurize Atlantis' onboard propellant tanks. The countdown to launch begins at 4 p.m. July 20. Launch of STS 43 continues to be on schedule for 10:54 a.m. July 23. [KSC SHUTTLE STATUS REPORT, 10 a.m. July 18, 1991, Banke, FLORIDA TODAY, p. 4A, July 19, 1991.]

II

STS 48: DISCOVERY'S PROCESSING FLOW

Technicians in the Orbiter Processing Facility's High Bay 1 have completed a positive pressure test of the Orbiter's wing. They are also engaged in replacement of the liquid hydrogen recirculation pump package aboard the Orbiter and inspections of the main propulsion system. The flight control system is being tested as is a newly installed Tacan no. 2. Reconnection of a control panel in Discovery's middeck is underway as are thermal protection system operations, cleaning of the payload bay and closeouts of the midbody and aft compartment. Scheduled work includes: Orbiter positive pressure leak checks, cycling of payload bay doors, payload bay inspections, determination of the Orbiter's weight and center of gravity and rolling the vehicle over to the Vehicle Assembly Building on July 24. Meanwhile, work continues on readying the Space Shuttle Columbia for its ferry-flight to Palmdale, CA, for extensive modifications. The Orbiter's heat shields have been removed from around the main engines, the left OMS pod has been electrically disconnected from the vehicle and the Ku-band antenna has been removed. The latest addition to the Space Shuttle fleet - Endeavour - has

also been undergoing processing operations prior to its 1992 maiden voyage on STS 49. The freon coolant loops are being dried; various sensors are being installed in the vehicle as well as linkages for the external tank door and the payload bay door drive shaft. Endeavour is also undergoing thermal protection system operations or tile work. The Orbiter is scheduled to be transferred from VAB High Bay 2 to OPF Bay 1 on July 24. [KSC SHUTTLE STATUS REPORT, July 18, 1991.]

July 19:

ATLANTIS DELAYED A DAY

A faulty electrical circuit used to separate Atlantis from its fuel tank during flight has delayed the launch of STS 43 for one day; liftoff is now scheduled for July 24 during a launch window running from 10:55 a.m. through 3:12 p.m. The circuit was tested unsuccessfully today. When technicians entered the aft compartment to analyze the failure they found a frayed wire which is due to be repaired and retested. The circuit involves the left-hand Orbiter/external tank attach point separation function. To prevent further delay, the repairs must be completed by noon July 20 to allow for the pressurization of on-board tanks filled with propellant. Failure to achieve full separation of the tank from the Orbiter could result in the destruction of the crew and the vehicle. The arrival of the STS 43 crew of Commander John Blaha, Pilot Michael Baker and Mission Specialists Shannon Lucid, James Adamson and G. David Low - was delayed until July 20 at 1 p.m. [Banke, FLORIDA TODAY, p. 1A, July 19, 1991, KSC PRESS DOME, "Launch Delay Announcement," 5 p.m., July 19, 1991.]

July 20:

CIRCUIT FIXED; COUNTDOWN BEGINS

With its faulty electrical circuit repaired and tested, Atlantis is cleared for the countdown to begin today. Kennedy Space Center spokesman Bruce Buckingham said, "Barring any unforeseen problems, we're in a good position for launch Wednesday morning [July 24]. Everything tested out just fine." The nine-day STS 43 mission is scheduled to land August 2 at KSC, the first time since 1985 that the space center has been the primary landing site. Tomorrow, technicians will complete work in the Orbiter's rear engine compartment and seal it for liftoff; final payload preparations should be finished July 22, according to Buckingham. [Brown, FLORIDA TODAY, p. 1A, July 21, 1991.]

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ATLANTIS CARRIES NEW SOFTWARE

The five general purpose computers aboard the Space Shuttle Atlantis for the STS 43 mission will run some new software for the first time. Rob Kelso, NASA Flight Director for STS 43, said, "Periodically we bring in new software that gives us new capabilities. This will give us a lot more flexibility." The Orbiter will be able to perform certain maneuvers with six small steering thrusters rather than 38; that will save fuel and make the ride a little easier for sensitive cargo. ["Atlantis Will Carry New Software," FLORIDA TODAY, July 21, 1991.]

ATLANTIS' MANIFEST: MORE THAN TDRS

The Space Shuttle Atlantis will carry more cargo into space than the Tracking and Data Relay Satellite (TDRS-E) which is its prime payload. One of these is SHARE-II, an acronym for the Space Station Heat Pipe Advanced Radiator Experiment which is designed to test how well a pumpless cooling system can dissipate heat; the system, when fully developed, is intended for use on Space Station Freedom. Also on the manifest is the Shuttle Solar Backscatter Ultra-Violet Instrument (SSBUV) which will calibrate ultraviolet instruments on orbiting satellites from two canisters located in the cargo bay. The information from this experiment will ultimately be used to calibrate ozone-measuring instruments aboard satellites.

The Optical Communications Through Window Experiment (OCTW) contains two transmitter/receiver modules. One is mounted in the payload bay; the other is in the aft flight deck for operation by the crew. The experiment should demonstrate video and audio transmission via fiber optic cable, versus conventional radio frequency transmission.

Flying for the first time is the Tank Pressure Control Experiment (TPCE) which is aimed at determining the effectiveness of jet mixing as a means of controlling tank pressures and equilibrating fluid temperatures. The experiment features a Get Away Special canister mounted on an adapter beam.

The Auroral Photography Experiment (APE-B) is also located in the aft flight deck and features a camera and associated equipment. It will involve extensive photography of auroras, aurora optical effects, Shuttle glow phenomena, and thruster emissions.

The Protein Crystal Growth (PCG-III) experiment will fly in the Orbiter's middeck and will supply data on the scientific methods and commercial potential for growing large high-quality protein crystals in microgravity.

In the same field, current processes for growing large protein crystals in microgravity will be studied in the Bioserve-Instrumentation Technology Associates Materials Dispersion Apparatus (BIMDA). Investigations into Polymer Membrane Processing (IPMP) is designed to flash evaporate mixed solvent systems in the presence of convection to control the porosity of a polymer membrane.

The Space Acceleration Measurement System (SAMS) is designed to provide data to other payloads on the acceleration environment of the middeck. The Solid Surface Combustion Experiment (SSCE) will make the second of eight planned flights on STS 43. It is designed to measure flame spread rate, solid-phase temperature, and gas-phase temperature for flames spread in the reduced gravity environment of space. Also making a return aboard a Space Shuttle is the Air Force Maui Optical Site (AMOS) experiment in which the Orbiter serves as a calibration target for this electro-optical facility on the Hawaiian island of Maui. [Date, THE ORLANDO SENTINEL, July 21, 1991, NASA FACTS, KSC RELEASE NO. 72-91, June 1991.]

July 21:

CRACK FOUND: NO DELAY EXPECTED

A small crack was found in Atlantis' engine compartment today, but the problem is not thought likely to delay the July 24 launch of STS 43. The countdown began at 4 p.m. today; the crew of five astronauts arrived at the Shuttle Landing Facility in their T-38 training jets some twenty minutes after countdown began. Commander John Blaha spoke on arrival, "We're happy to be here. We hope the weather is good Wednesday morning for the launch so we can be out of here for a nine-day spaceflight." The Commander and Pilot will fly in the Shuttle Training Aircraft tomorrow and the entire crew will receive medical examinations, review flight data files and perform fit checks of their flight equipment. Forecasters presently call for a 70 percent chance of favorable weather at launch time. Technicians found a 4 1/2 inch crack in a structural beam on the floor of Atlantis' rear engine compartment in a review of photographs taken just before the compartment was to be closed for flight. Managers said the flaw was not a concern for flight; the crack measures from about one-eighth to one-sixteenth of an inch. Referring to a series of technical problems which have cropped up late in the Orbiter's processing, Shuttle Test Director Al Sofge said, "I guess we're a little snakebit." [Brown, FLORIDA TODAY, p. 1A, July 22, 1991, KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991.]

July 22:

LAUNCH MINUS TWO DAYS

This afternoon liquid oxygen and liquid hydrogen reactants will be loaded into Atlantis' onboard storage tanks as the countdown to launch of the STS 43 mission continues. The Shuttle main engines and main propulsion system are being prepared for flight. The 4.4 inch crack found yesterday on one of the structural beams in the aft compartment has been repaired and the compartment was closed out this morning at 5 a.m. The payload bay doors were closed and ready for flight ten minutes later, at 5:10 a.m. Trickle charging of the Tracking and Data Relay Satellite batteries have been charged and a faulty firing circuit has been replaced. Final ordnance connections and firing circuit tests have also been completed as has pressurization of the Orbiter's hypergolic propellant system tanks for flight. The Orbiter's communications system will be activated tonight. At 2:35 a.m., pad technicians will begin loading the external tank with half a million gallons of liquid oxygen and liquid hydrogen propellants. Launch is expected to come at 10:55 a.m. July 24. Weather is expected to allow for a 50% probability for launch and the chance of violating constraints for the entire launch period is rated at 40%. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991, "Shuttle Mission," USA TODAY, p. 3A, July 23, 1991, Date, THE ORLANDO SENTINEL, July 23, 1991, Date, THE ORLANDO SENTINEL, July 22, 1991.]

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STS 48 PROCESSING CONTINUES

The liquid hydrogen recirculation pump package has been installed upon Discovery in preparation for its STS 48 mission. A retest of a control panel in the middeck has also been completed. Tests of the newly installed Tacan no. 2 are underway. Other tasks in process include: cleaning the payload bay, closeouts

of the midbody and aft compartment, thermal protection system operations, positive pressure leak test of the aft compartment and inspections of the radiators. Work scheduled includes: Orbiter positive pressure leak checks, cycling of the payload bay doors, payload bay inspections and cleaning, determination of the Orbiter's weight and center of gravity and its rollover to the Vehicle Assembly Building now targeted for early morning on July 25, delayed a day by the change in the STS 43 launch day to July 24. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991.]

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COLUMBIA'S LEFT OMS POD REMOVED

The left OMS pod has been removed from the Space Shuttle Columbia in preparation for its ferry flight to California. Preparations are under way to remove the right orbital maneuvering system pod and the power reactant storage and distribution system tanks. Thermal protection system (tile) operations are also proceeding. Technicians will begin the removal of Columbia's three main engines tomorrow (July 23) as well as the installation of the mock OMS pods. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991.]

July 23:

WEATHER CONCERNS STS 43 MANAGERS

There is only a 50 percent chance that weather will allow Atlantis to meet its 10:55 a.m. launch time tomorrow; however, the Orbiter will be ready, NASA managers said today. Overall, there is a 60 percent chance that weather will be favorable for launch during the window which extends until 3:12 p.m. The repair work in the Shuttle's aft compartment has been completed and the payload doors have been closed for flight. The astronauts who will fly on the STS 43 mission have had medical examinations and have checked out their flight equipment. Today the crew will receive a briefing on the status of Atlantis, its payload and the weather. Commander John Blaha and Pilot Michael Baker spent a portion of the day practicing approaches and landings on the Kennedy Space Center Shuttle Landing Facility where Atlantis is due to touch down on August 2. Prelaunch pad work continues as technicians have bonded two carrier panels on the payload bay doors, one each on the left and right doors. The external tank will be loaded with 500,000 gallons of liquid oxygen and liquid hydrogen propellants beginning at 2:35 a.m. tomorrow. Liquid oxygen and liquid hydrogen reactants have loaded into the Orbiter's onboard storage tanks. The Shuttle main engines and main propulsion system have been prepped for flight and the Orbiter's communications system has been activated. The tail service masts have been prepared for launch and crew seats have been installed in the crew cabin. The crew will be awakened at 6 a.m. and departs for Launch Complex 39A at 7:40 a.m. [Brown, FLORIDA TODAY, p. 1A, July 23, 1991, KSC SHUTTLE STATUS REPORT, 11 a.m., July 23, 1991.]

July 24:

STS 43 SCRUBBED: COMPUTER PROBLEM

With the Space Shuttle Atlantis cleared for flight yesterday and the five-member crew "gung ho and ready to go," the STS 43 mission was scrubbed this morning

because channel A on the main engine controller for engine no. 2 had shut itself down and mission managers were unable to restart it. The problem occurred about 4:30 a.m. and tests were performed to determine the cause of the failure; then the launch was called off at 5:38 a.m. The delay may be as much as a week to ten days. A minor problem arose yesterday when technicians found that two of 64 fasteners that attach eight protective plates on the outside of the Orbiter's payload bay doors were broken; the two bolt holes were apparently stripped of their threads, a problem which has occurred before. Managers resolved the problem by deciding to fill the two holes with an adhesive and make a permanent repair after the mission was completed. "If it's not a concern structurally, you don't want to take a chance of mucking up something," said Shuttle Test Director Al Sofge. The postponement of the STS 43 mission came just when weather forecasters were predicting more favorable conditions for launch. [Brown, FLORIDA TODAY, p. 1A-2A, July 24, 1991, Date, THE ORLANDO SENTINEL, p. A-6, July 24, 1991, Hoversten, USA TODAY, p. 6A, July 24, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, July 25, 1991, STS 43 STATUS REPORT, 4:15 p.m., July 25, 1991.]

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STS 43 GROUNDED TILL AUGUST 1

Replacement and testing of a faulty computer that caused NASA to scrub today's launch of STS 43 will postpone the liftoff until at least August 1, officials said. Atlantis' five-member crew returned to Johnson Space Center (Houston, TX) after the scrub was announced. The failure of an engine controller in flight could have forced the crew to attempt a risky emergency landing overseas. Launch Director Robert B. Sieck said, "It was pretty obvious it was going to be a hardware changeout. You get over the disappointment pretty quickly and get on with the job." Commander John Blaha speaking for his crew said, "We wished we had launched and were up there right now, but we're totally behind NASA's decision to fix the problem. That's the right thing to do." The crew departed for Houston, TX, at 1:30 p.m.; the five-member crew will return to Kennedy Space Center three days before launch.

Launch pad technicians were immediately occupied with extending the rotating service structure around the vehicle, connecting the Orbiter's midbody umbilical unit for draining propellants from both the external tank and the onboard storage tanks. When that hazardous operation is completed, the technicians will climb into the rear engine compartment to remove the faulty controller and replace it with one on hand. This procedure has been done before on Atlantis prior to its October 1989 (STS 34, the Galileo mission) flight; that delay was just five days due to there having been no propellants onboard. A special work stand will have to be constructed to help lift the 213-pound controller; it measures 14-by-18-by 23 inches. NASA spokesman Bruce Buckingham rejected the idea that there was a generic problem with the controller saying, "The more you fly, the more likely we are to duplicate a failure." Jerry Smelser, Main Engine Program Manager at Marshall Space Flight Center (Huntsville, AL) said, "We can't anticipate the kind of problem we had (Wednesday) morning. You can't guess why it happened or when it happened." The delay is not expected to impact negatively the planned

September flight of Discovery (STS 48) or Atlantis' next mission (STS 42) now scheduled for December. [Brown, FLORIDA TODAY, pp. 1A-2A, July 25, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., July 25, 1991, Leary, THE NEW YORK TIMES, p. A10, July 25, 1991.]

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BUSH ADMINISTRATION: NO NEW SHUTTLES

"In all probability, we have purchased the last Space Shuttle. It is time for a new phase in space launch," said Vice President **Dan Quayle** in a speech at Vandenberg Air Force Base (CA). Quayle, who chairs the National Space Council, said the new policy proposes to extend the life span of the Shuttle fleet and maintain the capacity to produce needed spare parts, "but the policy does not envision acquiring new Orbiters." Quayle went on to say, "It is time for a new phase in space launch. I am here to announce that as of today, we have entered that new phase." NASA Administrator **Richard H. Truly** said today that he supports the Bush Administration's new "National Space Launch Strategy." He said, "It is a thoughtful plan that lays out important priorities for a new launch system while still maintaining the inherent capability for Shuttle support or production in the event of an Orbiter loss or other demonstrable need." At Kennedy Space Center, Public Affairs Director **Chuck Hollinshead** said, "It doesn't seem to indicate a shift in policy. This is generally what we've been working toward. We will continue to see Shuttles flying out of here on a regular basis." U. S. Representative **Jim Bacchus** (D-Orlando, FL) said, "Ideally, I'd like to see another Shuttle, but realistically I think the administration's policy is correct."

The policy calls for joint development of a new family of launch vehicle by NASA and the Department of Defense. They would be based on new technology and replace the current launch vehicles. The policy also envisions making use of long-range missiles retired from military use as the need for nuclear missiles declines. The new policy states "due regard to economic impact on the commercial space sector" will be a concern. A new long-range plan to implement the new launch strategy is due in December and will be designed by joint effort of NASA, the Department of Defense and the Department of Energy. THE NEW YORK TIMES reported that the cost of developing a new family of launch vehicles might run as high as \$11.5 billion; the goal is to reduce the cost of launching from \$3,600 a pound to about \$300. The directive said that NASA and DOD "should actively explore having private industry take part in the new rocket plans." [Banke, FLORIDA TODAY, p. 6A, July 25, 1991, "Delay," USA TODAY, p. 3A, July 25, 1991, "U.S. Plans to Build No New Shuttles," THE NEW YORK TIMES, p. A10, July 25, 1991.]

July 25:

TEST FAILURE MAY DELAY STS 43 LAUNCH

A developmental Space Shuttle main engine sustained extensive internal damage while it was undergoing ground testing yesterday at NASA's Stennis Space Center (Bay St. Louis, MS). The test failure occurred at approximately four seconds after engine start when engine sensors detected abnormal operating conditions. Ground-control systems terminated the test immediately and there was no

apparent damage to the test stand on which the engine was mounted. The exact nature and extent of damage to the engine, as well as the cause of the incident, are being investigated. However, from initial external observations, the damage appears to be largely internal to the engine. A team of engineers with NASA and the prime contractor for the main engine, Rocketdyne Division of Rockwell International, have begun gathering all pertinent test data for analysis. The engine which was being tested is a development engine and its configuration is different from engines used in the Shuttle flight program.

"Failures such as this do occur from time to time in the aggressive ground-test program that we've always maintained, and especially when we're testing advanced design components. However, it has been over two years since we've had such an incident and during that time, we've accumulated over 100,000 seconds of engine operation, with 257 engine starts," said Jerry Smelser, (Main Engine Project Office Manager, MSFC). "The engine, unit number 0215, had been tested extensively in the past. It had been run 15 times prior to the aborted test, with an accumulated run time of 5,255 seconds, or approximately 87.6 minutes." Referring to the incident itself, Smelser said, "It was not spectacular at all. You just saw the steam come out and then it suddenly stopped. I didn't even know there had been any damage to the engine until much later," said Stennis spokesman Myron Webb. If investigators determine that the problem which caused the destruction of the engine at Stennis could occur with one of Atlantis' main engines, the launch of the Orbiter could be further delayed. Tentative plans are to launch August 2, but, if the replacement and retesting goes well, August 1 is a possibility. [Banke, FLORIDA TODAY, p. 1A, July 26, 1991, NASA NEWS RELEASE NO. 91-118, July 25, 1991.]



DISCOVERY READIED FOR TRANSFER

The landing gears have been retracted on the Space Shuttle Discovery in preparation for its transfer to the Vehicle Assembly Building's High Bay 2 this afternoon. The Orbiter has been bolted to the crawler transporter and its weight and center of gravity have been determined. Meanwhile, all three main engines have been removed from Columbia; freon coolant loop no. 1 has been deserviced and the power reactant storage and distribution system tanks have been removed. Purges of the potable water system continue as do thermal protection system operations and the installation of closeout panels and the ferry flight cover for the forward reaction control system. The mock OMS pods must still be installed prior to the Orbiter's ferry flight to Palmdale, CA. [KSC SHUTTLE STATUS REPORT, July 25, 1991.]



DISCOVERY, ENDEAVOUR SWITCH PLACES

The Space Shuttles Discovery and Endeavour switched places late tonight. Discovery was rolled from the Orbiter Processing Facility into the Vehicle Assembly Building at 11:55 p.m. to be readied for its September launch. The Endeavour was rolled from the VAB into the OPF at 11:40 p.m., for further

preparations for its May 1992 flight. [Banke, FLORIDA TODAY, p. 4A, July 27, 1991.]

July 26: PLATFORMS READIED FOR REPLACEMENT

Pad technicians have completed setting up platforms on the top deck of the mobile launcher under Atlantis' main engine number 3 and access to the Orbiter's aft compartment has been gained. Propellants have been drained from the Orbiter's onboard storage tanks. The main engines must be positioned and locked into place and the faulty controller must be electrically disconnected. The Tracking and Data Relay Satellite must be recharged. Still scheduled are the removal of heat shields around the main engine, the removal and replacement of the controller - now scheduled for July 27 - and testing of the new controller July 28. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 26, 1991.]

July 27: COMPUTER REPLACEMENT PREPARATIONS

The main engine controller which caused the STS 43 mission to be scrubbed July 24, will be replaced today and retested, according to Kennedy Space Center spokeswoman Lisa Malone. Launch may come as early as August 1. Still under discussion is the impact, if any, of the failure of a Shuttle main engine in a test at Stennis Space Center (Bay St. Louis, MS). Russell Bardos, Deputy Director of Systems Analysis at NASA Headquarters, said, "Prior to launch, we have to have a pretty good understanding of what the failure was." If engineers believe that whatever caused the test failure could pose a similar problem for Atlantis, the launch could be delayed beyond August 1. The test engine, however, was not identical to those on Atlantis. NASA managers meet July 29 to discuss the situation. [Banke, FLORIDA TODAY, p. 4A, July 27, 1991.]

□ SOFGE, LEINBACH PROMOTED AT KSC

Al Sofge and Mike Leinbach, who have both served as NASA Test Directors, have been promoted to the newly created post of Shuttle Test Director at Kennedy Space Center. They are responsible for all Shuttle testing and launch preparations from a console in the Launch Control Center adjacent to the Vehicle Assembly Building. The console is managed 24 hours a day, seven days a week. Shuttle Test Directors will assume the role of Chief NASA Test Director during the final nine hours of Shuttle countdowns; they will oversee the team of NASA Test Directors at KSC and will be available for special projects to Shuttle Launch Director Robert B. Sieck. [Banke, FLORIDA TODAY, p. 9E, July 28, 1991.]

□ ATLANTIS: CONTROLLER INSTALLED

Technicians installed a new main engine controller today and tests of the new unit begin tomorrow; The computer will control main engine no. 3. If the testing is successful, launch could come as early as August 1, otherwise a second attempt would occur the next day. [Banke, FLORIDA TODAY, p. 1A, July 28, 1991.]

July 29:

MANAGERS TO SET DATE FOR STS 43

The countdown for STS 43 may begin today because the installation and testing of a replacement controller for Atlantis' main engine no. 3 went very well. "At this point it looks achievable. We are leaning toward picking up the countdown on Monday [July 29], but we haven't committed to it yet." This morning, Shuttle managers meet at Kennedy Space Center to discuss the Orbiter's readiness for flight and set an official date. If the countdown is not begun today, it will most likely begin tomorrow aiming for an August 2 launch. **Barbara Schwarz**, a spokeswoman for Johnson Space Center (Houston, TX) said, the five-member astronaut crew will return to Kennedy Space Center no earlier than tomorrow. The crew is practicing flight maneuvers on a simulator at JSC today. [Banke, FLORIDA TODAY, p. 1A, July 29, 1991.]

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LAUNCH DATE UPDATE: STS 43

Launch is targeted for 11:01 a.m. EDT August 1. Senior Shuttle Managers will not give a final go for liftoff until tomorrow (July 30) after they have reviewed the data from the failed engine test at Stennis Space Center last week. "We really don't feel that's going to be a concern with Thursday's launch attempt," said **Eric Redding**, NASA Test Director. Redding emphasized that the test engine was not only not identical to the Shuttle main engines now in use on Atlantis, but it had also been fired many more times than any Shuttle engine that had flown. The probability for being within launch weather criteria at the opening of the window is 60 percent. There is a 70 percent chance for good weather for the entire window which ends at 3:06 p.m., according to KSC spokesman **Bruce Buckingham**. Work in progress: preparations to start the launch countdown at 4 p.m. EDT, closeouts of the aft compartment and installation of the aft compartment. Scheduled work includes loading of liquid oxygen and liquid hydrogen reactants into the Orbiter's onboard storage tanks; closing of the aft compartment July 30; flight crew arrival; retraction of the rotating service structure away from the vehicle July 31 at 11 a.m.; loading of the external tank for flight begins at 2:41 a.m. August 1 at the T minus 6 hour mark. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 29, 1991, Brown, FLORIDA TODAY, p. 1A, July 30, 1991, "Shuttle Countdown," USA TODAY, p. 3A, July 30, 1991.]

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DIGITAL EQUIPMENT CONTRACT - KSC

Kennedy Space Center has awarded an \$8.5 million contract to Digital Equipment Corp. (Orlando, FL) for the design, installation and on-site support of a Payload Data Management System (PDMS) to handle Space Shuttle and Space Station payload processing requirements. DEC will be responsible for assisting NASA and its payload ground operations contractor, McDonnell Douglas Space Systems, Co., with the implementation and successful operation of the PDMS, a highly sophisticated multiple computer system that will lead to more efficient and streamlined payload operations. Primary capabilities of the PDMS include storage of a data base and all documents relevant to NASA payload operations. The system will also produce and track the schedules of all KSC payloads as well as

the equipment and manpower needed to process space flight hardware. The PDMS will be fully accessible and communicable with similar systems at other NASA facilities. "We believe the PDMS will provide a more cost effective and productive working environment," said KSC Payload Management and Operations Director **John Conway**. "PDMS is a sound investment in efficiency and savings for payloads being processed now and in the coming years." The contract is for five years and runs from July 29, 1991, and runs through July 28, 1996. [NASA/KSC RELEASE NO. 89-91, July 29, 1991.]

July 30:

STS 43: MANAGERS SAY GO!

Senior NASA officials today gave the go-ahead to proceed toward the launch of STS 43 on August 1. The managers cleared Atlantis to fly following a review of the analysis conducted on a non-flight configuration Shuttle main engine that was damaged during ground testing at Stennis Space Center last week. To date, analysis points to a failure in the high pressure fuel turbine on the development test engine. "All three of Atlantis' main engines have significantly less run time than components on the development engine that experienced the failure," said Shuttle Director **Robert L. Crippen**, "and the fabrication, inspection and repair histories of these units are well within our experience base for Shuttle engines." [NASA/KSC STS-43 LAUNCH ADVISORY, July 30, 1991.]

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STS 43: LAUNCH MINUS 2 DAYS

The countdown for STS 43 was started at 4 p.m. July 29 and held at the T-27 mark for a built-in hold. The countdown resumed at noon today. **Mike Leinbach**, Shuttle Test Director, said, "Everything's going well. We're not tracking any problems that would prevent us from getting to a launch attempt Thursday morning." All non-flight items have been removed from the aft compartment of Atlantis and the batteries of the Tracking and Data Relay Satellite have been charged. Currently, pad technicians are inspecting and closeout the aft compartment and are loading liquid oxygen and liquid hydrogen reactants into the onboard storage tanks. Some pre-flight preparations had to be handled gingerly when stormy weather, including a funnel cloud, moved over Kennedy Space Center. The change in work plans did not cause any unexpected delays in launch plans. The STS 43 flight crew arrived at 12:15 a.m. today after a week of training at Johnson Space Center (Houston, TX). "We're glad to be back. We're looking forward to a launch on Thursday," said Mission Commander **John Blaha**. The crew, which also includes Pilot **Michael Baker** and Mission Specialists **G. David Low**, **Shannon Lucid** and **James Adamson**, arrived in their T-38 training jets.

Among the tasks remaining to be done are: activation of the Orbiter's communication system, scheduled for midnight; preparing the main engines and main propulsion system for tanking and launch; retracting of the rotating service structure away from the vehicle about 11 a.m. tomorrow; loading of the external fuel tank for flight which begins at 2:41 a.m. August 1 at the T minus 6 hour mark. The probability for being within launch weather criteria at the opening of the window is 70 percent. There is an 80 percent chance of having acceptable

weather for the duration of the launch window. Atlantis is expected to conclude its STS 43 mission with a landing at Kennedy Space Center on August 10; Edwards Air Force Base [CA] will serve as the backup site. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 30, 1991, Banke, FLORIDA TODAY, p. 1A, July 31, 1991.]



STS 48 PROCESSING CONTINUES

The Space Shuttle Discovery continues to undergo processing for its STS 48 mission expected to come in September. The Orbiter will be mated to its external tank and solid rocket boosters no earlier than August 1. Rollout to Launch Pad 39A is targeted for August 12. Currently technicians are monitoring the vehicle's systems. Endeavour, being readied for its STS 49 mission next year, has had its right mock orbital maneuvering system pod removed. Currently technicians are installing panels and electronic panels which are necessary for powering up the vehicle and they are establishing access to all areas of the vehicle; preparations are also underway to service the vehicle with freon. Work scheduled includes opening of the payload bay doors, power-up testing of all vehicle systems August 5. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 30, 1991.]



COLUMBIA READIED FOR FERRY FLIGHT

The oldest Space Shuttle, Columbia, is being readied in OPF Bay 2 for its cross-country flight to Palmdale, CA, for extensive modifications. The ferry cover for the forward reaction control system has been installed and the auxiliary power unit catch bottles have been removed. Technicians are inspecting Columbia's payload bay door seal and preparing to install the simulated left orbital maneuvering system pod. Thermal protection system (tile) operations are underway. The payload bay doors will be closed for the last time before flight shortly and the tail cone still must be installed. On August 7, Columbia will be transferred to OPF Bay 3 for a one-day facility fit check and the Orbiter's ferry flight to California is targeted for August 9. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 30, 1991.]



NEW CENTER SUPPORT DIRECTOR: JONES

Marvin L. Jones was named Director of Center Support Operations by Kennedy Space Center Director Forrest S. McCartney; Jones' promotion is effective August 4. Jones succeeds the late Jim Rice who died June 12 following a long illness; Jones had been serving as Acting Director since Rice's death. Jones joined NASA in October 1985 and has served as Director, Safety, Reliability and Quality Assurance, and Protective Services as well as Director of the Protective Services Office. Jones has been Deputy Director of Center Support Operations since January. Before joining the space agency, Jones commanded the Eastern Space and Missile Center (Patrick Air Force Base, FL); he served 20 years in the U.S. Air Force. Center Support Operations Directorate provides assigned base operations, maintenance and center support services for all KSC and tenant organizations on the center, certain joint services for the Eastern Space and Missile Center, and

manages space vehicle propellants for NASA and other government agencies and their contractors. [NASA/KSC RELEASE NO. 90-91, July 30, 1991.]



LIGHTNING RESEARCH IMPACTS PLAYALINDA BEACH

The northern portion of NASA-owned Playalinda Beach on Canaveral National Seashore will be closed on weekdays from August 5 through August 30 to permit the safe conduct of a research program designed to enhance the accuracy of lightning forecast systems. The research program is being conducted through the launch of three-foot-long folding fin rockets trailing hair-thin strands of copper wire into thunderstorms to trigger lightning strokes. Launches will be conducted from a pad on the western shore of Mosquito Lagoon on the northern portion of the Merritt Island National Wildlife Refuge. [NASA/KSC RELEASE NO. 87-91, July 30, 1991.]

July 31:

STS 43: LAUNCH MINUS ONE DAY

AT 10 a.m. this morning, the countdown for STS 43 was in a built-in hold of 12 hours, 41 minutes at the T-11 hour mark. The clock will resume at 8:41 p.m. tonight. The rotating service structure was retracted at 10 this morning; pad technicians were preparing the main propulsion system and Shuttle main engines for flight, preparing the pad area for launch and installing flight crew time critical equipment. The Orbiter's communication system has been activated and crew seats have been installed in the flight and mid decks. The crew has been receiving vehicle, weather and payload briefings today. Still remaining to be done: preparing the fuel cells for launch later tonight; loading of the external tank for flight beginning at 2:41 a.m. at the T-6 hour mark; the flight crew is awakened at 6:06 a.m. and departs for the launch pad an hour and forty minutes later. Launch is targeted for 11:01 a.m. and the window runs till 3:06 p.m. The probability for being within launch weather criteria at the opening of the launch window is 70 percent; the probability for favorable weather improves to 80 percent over the course of the window. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 31, 1991.]



U.S./U.S.S.R SPACE COOPERATION

The United States and the Soviet Union have agreed to expand civil space cooperation by flying a U.S. astronaut on a long-duration Soviet space station Mir mission and a Soviet cosmonaut on a U.S. Space Shuttle mission, increase cooperation in monitoring the global environment from space and initiate annual consultations activities. The agreement was reached by Presidents **George Bush** and **Mikhail Gorbachev** during the July 30-31 Summit in Moscow. These initiatives were developed for the U.S. side under the guidance of the National Space Council, chaired by Vice President **Dan Quayle**. The purpose of the exchange of flights is to conduct Life Sciences research of mutual interest. It would advance current efforts to standardize in-flight medical procedures which would improve comparability of data taken by each side. The exchange would involve training of the crew members at appropriate U.S. and Soviet facilities, exchange of medical equipment for flight on the space missions and establishment of a

telecommunications link between appropriate facilities of the two sides for use during missions. A new joint working group (JWG) on manned space flight will be established as an annex to the 1987 U.S./U.S.S.R. space science agreement to implement the flight project. The manned space flight JWG will work with the existing JWG on Space Biology and Medicine, which will be responsible for implementing the life sciences research. The agreement also calls for expanded cooperation in the monitoring of the global environment. Both sides will exchange information on their respective plans for Earth observation programs and develop cooperation where joint action could improve Earth science research and environmental monitoring on a global scale and facilitate the free and open international exchange of data from those programs. This cooperation will be carried out by the U.S./U.S.S.R. Earth Sciences JWG. It was also agreed to hold annual meetings between the two governments on civil space issues and cooperative activities. The JWGs are coordinated on the U.S. side by NASA and the Department of State-led "Interagency Working Group on U.S./Soviet Space Cooperation," under the guidance of the National Space Council. [NASA/KSC RELEASE NO. 91-122, July 31, 1991, Halvorson, FLORIDA TODAY, p. 1A, August 1, 1991.]